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Life History and Habits of *Pseudohylesinus nebulosus* (Leconte) (Coleoptera: Scolytidae) in the Interior of British Columbia[1]

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Introduction

The Douglas-fir hylesinus, *Pseudohylesinus nebulosus* (Leconte), is a common bark beetle in western North America from British Columbia to Mexico. Although Douglas fir, *Pseudotsuga menziesii* (Mirb.) Franco, is the preferred host, the beetle has been collected[2] also from western red cedar, *Thuja plicata* Donn, grand fir, *Abies grandis* (Dougl.) Lindl., amabilis fir, *Abies amabilis* (Dougl.) Forb., and western hemlock, *Tsuga heterophylla* (Raf.) Sarg., on the west coast of British Columbia, and from western hemlock and western yellow pine, *Pinus ponderosa* Laws., in the interior of the Province. Swaine (1918) describes *Pseudohylesinus nebulosus* (Lec.) as "a slender species, with strong colour-markings in dark and light reddish-brown; the male very densely clothed with stout scales; the epistomal lobe strongly developed; length, 2.8 mm.; width, 1.2 mm. The supposed female has interspace 9 on the declivity less strongly serrate, and the elytral scales decidedly elongate and becoming plumose towards the base."

Although the insect infests and kills saplings it is of minor economic importance since it usually confines its attacks to thin-barked slash of Douglas fir. A knowledge of the life history and habits of the Douglas-fir hylesinus is desirable for an understanding of the effects of inter-specific competition on the Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopk., with which the hylesinus is usually associated.

The study described in this paper seemed advisable in view of the inconclusive results obtained by Harris (1954) in the interior of British Columbia and the differences between the results of studies undertaken in California by Chamberlin (1939) and on the coast of British Columbia by Hopping (1928). Chamberlin found that the hylesinus had two generations, each apparently with one brood per year. Studies by Hopping at Pender Harbour indicated one and a partial second generation with three broods per year. The present study was made in 1955 near Lumby at an elevation of 2,100 feet. Gallery systems were sampled on slash scattered over an area of about four square miles. The data thus obtained were supplemented by observing the behaviour of beetles in infested slash placed in three cloth cages.

Life History and Habits

Pseudohylesinus nebulosus (Lec.) is the earliest bark beetle to infest Douglas fir in the spring. In the field the first attacks of the hylesinus were observed on May 5 whereas the Douglas-fir beetle was first observed on May 17. The hylesinus apparently prefers old slash since it confined its attacks until May 9 to trees felled in July and August 1954, and to slash laid down in logging operations during the winter. The peak attack occurred on May 8 and one day later attacks were observed on a tree felled May 2, 1955. Examinations up to November of trees felled at intervals of two weeks from May 2 until July 21 and of slash

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Fig. 1. Section of bark of Douglas fir showing density of infestation by *Pseudohylesinus nebulosus* (Leconte).

Fig. 2. Partially completed gallery systems of *P. nebulosus* with larval mines diverging towards the ends of the gallery.

from summer logging operations revealed no attacks later than May 27. Uninfested material from Douglas-fir trees cut in July and August 1954 and May and June 1955 remained uninfested when placed in cages on May 29 with material infested by the spring flight. Although the hylesinus has been reported from several hosts in the Interior, material from western white pine, western yellow pine, lodgepole pine, and hemlock was uninfested in the field and in the cages.

The hylesinus is monogamous and once an entrance hole is bored through the bark to the cambium the insects work in pairs to excavate a short longitudinal egg gallery. The gallery is first projected either up or down the grain of the wood. After the eggs are laid in this section of the gallery the procedure is then repeated on the opposite side of the entrance hole. The average length of 147 galleries was 0.8 inches with a maximum of 1.9 inches. The average width was 0.06 inches. The gallery is excavated in the cambium and does not score the sapwood. The absence of scoring provides a means of distinguishing the work of the hylesinus from the otherwise similar work of *Scolytus unispinosus* Lec. In addition, the cone-shaped accumulation of boring dust which marks the entrance hole is reddish in the case of the hylesinus while that of *Scolytus* is yellowish from the wood particles in the dust.

Attacks of the hylesinus are often so dense (Fig. 1) that whole sections of slash become unsuitable for attacks of the Douglas-fir beetle. In particular, the thin-barked tops left in winter logging operations are often completely occupied by attacks of the hylesinus. On one bark sample of 2.5 square feet taken from a top there were 121.7 attacks per square foot. The average density of attack on 23 other samples with a total bark area of 12.5 square feet was 50.6 per square foot. Attacks of the hylesinus, although most common in thin bark down to 0.1 inches, were found in a log with diameter of 18 inches and bark thickness of 1.4 inches.

Eggs are laid singly in niches cut on both sides of the egg gallery at intervals of about 0.05 inches. The average number of eggs laid in 102 galleries was 18.1

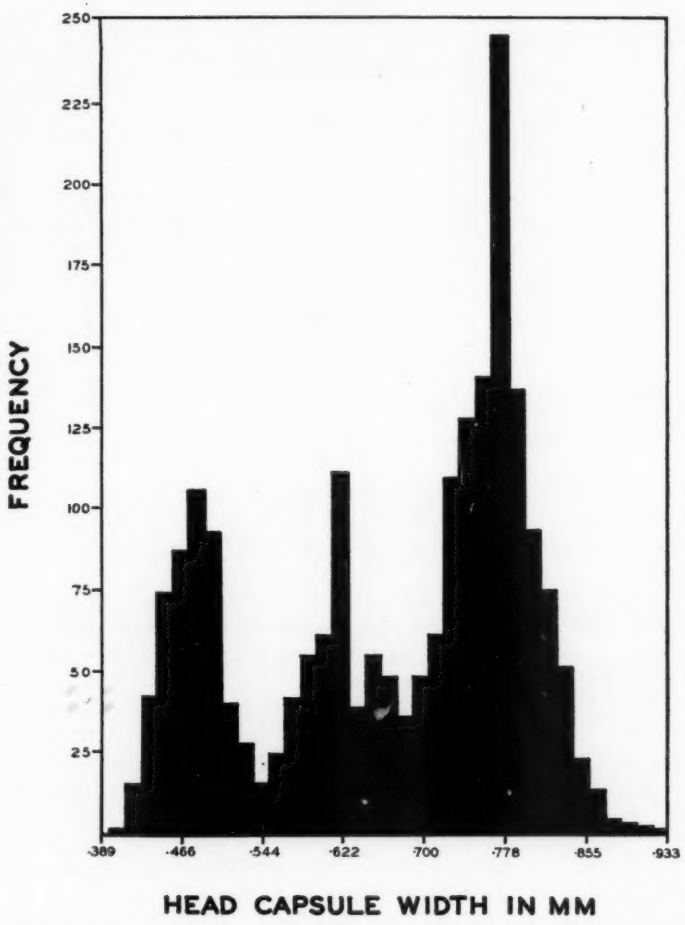

Fig. 3. Histogram of frequency distribution of head-capsule widths of *Pseudohylesinus nebulosus* (Leconte).

of which an average of 13.8 hatched. The maximum number of eggs in a single gallery was 43. Incubation period was approximately 15 days.

The first larva was observed on June 2. The larvae mine for a short distance at right-angles to the egg gallery before diverging towards the ends of the gallery (Fig. 2). The average length of 1441 mines was 0.9 inches with a maximum of 1.6 inches.

To determine the number of instars and duration of stadia, about 50 larvae were collected daily from June 2 to August 1 from various types of Douglas-fir slash scattered over about four square miles of forest. Head-capsule width was measured on 2110 larvae with a calibrated ocular micrometer at a magnification of 100X to the nearest 0.015 mm. A histogram of the frequency distribution of the head-capsule width is presented in Figure 3. The data were smoothed and analysed according to the method described by Forbes (1953). Analysis

TABLE 1

Head-Capsule Width and Length and Frons Width in Mm. of the Instars of *Pseudohylesinus nebulosus* (Lec.)

Instar	Head Capsule				Frons Width	
	Width		Length			
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
1	.479	±.032	.432	±.027	.265	±.017
2	.617	±.028	.529	±.053	.379	±.029
3	.771	±.046	.672	±.058	.485	±.030
No. Specimens	2110		745		103	

indicated that there were three instars although the calculated values did not entirely correspond to the smoothed data (Chi square = 27.84 for 24 degrees of freedom). However, the discrepancies were small and possibly due to some factor such as sex.

Head-capsule length and frons-width were measured on 1007 and 129 larvae respectively. For descriptive purposes measurements were tabulated of specimens whose head-capsule width fell within the range of the mean plus or minus one standard deviation.

Table 1 presents a summary of head capsule and frons measurements for each instar.

The approximate duration of each stadium was determined (Table 2) by the method described by Prebble (1933) in which each stadium is considered equivalent to the interval between the first date when that instar formed the majority of the population and the first date when the succeeding instar formed a similar proportion of the population. The percentage occurrence of the larval instars during their development is shown in Figure 4.

Third-instar larvae bore into the inner bark and are usually not visible on the cambial surface when pupating. The pupal period was approximately 8 days.

On June 1 parent adults began emerging from host material in the field and in the cages. Table 3 shows the disposition of the remaining parents and their progeny until August 24. Only 10.2 per cent of the parent adults were found in the 216 galleries examined from July 21 to August 24. Since all were dead it appears possible that the remainder die shortly after emerging. This view is

TABLE 2

Estimated Length of Stadia of *Pseudohylesinus nebulosus* (Lec.)

Instar	Date When Stage First Formed Majority of Population	Duration of Stadium (Days)
1	June 7	11
2	June 17	13
3	June 29	17
Pupa	July 15	–

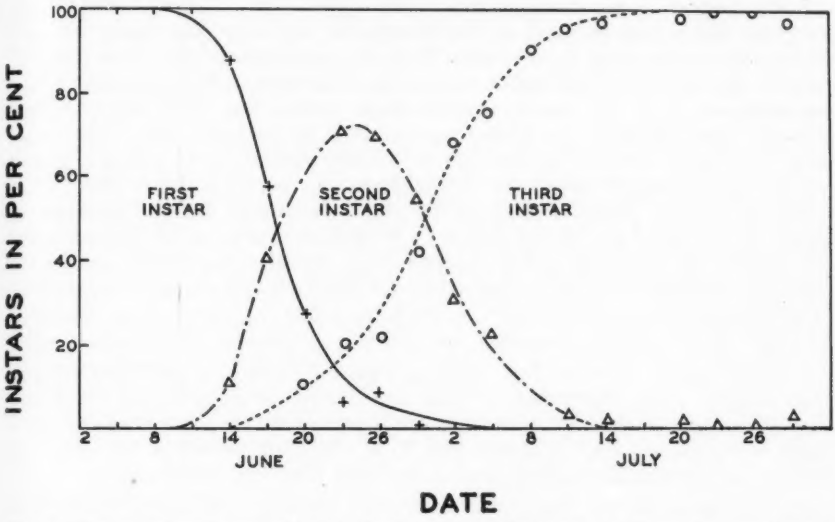

Fig. 4. Per cent occurrence of larval instars of *Pseudohylesinus nebulosus* (Leconte) 1955.

supported by the large numbers of dead adults found in the cages from August to November.

Emergence of teneral adults from caged material commenced on August 15 and continued until September 22 with peak emergence on August 27. In the field, emergence holes of teneral adults were first observed on August 24. The tenerals in the cages, although active and capable of flight, at first ignored logs of Douglas fir, yellow, white, and lodgepole pines, and hemlock which were introduced into the cages on June 20. On the basis of counts of number of entrance holes and number of emergence holes on 232 galleries the rate of increase was calculated as 140.9 per cent.

TABLE 3

Seasonal Occurrence of Life Stages of *Pseudohylesinus nebulosus* (Lec.)

Date 1955	Number Galleries Examined	Per Cent Galleries Without Parents	Per Cent Galleries With One Parent	Per Cent Galleries With Both Parents	Progeny		
					Per Cent Larvae	Per Cent Pupae	Per Cent Tenerals
June 21	14	0	100.0*	0	100.0	0	0
July 13	63	51.3	47.1*	1.6	59.8	40.2	0
July 21	12	75.0	25.0†	0	31.9	68.4	0
Aug. 4	40	82.5	17.5†	0	25.1	74.9	0
Aug. 8	76	94.7	5.3†	0	1.1	46.8	52.1
Aug. 18	45	95.6	4.4†	0	0.6	29.1	70.3
Aug. 24	43	90.7	9.3†	0	0	0.6	99.4

* Living. † Dead.

On August 28 the young adults in the cages were observed boring small, irregular niches into the bark of the Douglas-fir logs especially along the ends of the logs and in scars in the bark. Periodic examinations until November 23 showed that the adults feed and overwinter in these niches. Although some adults overwintered in niches cut in material from which they had emerged they showed a preference for the fresher host material cut in June 1955. The niches were frequently extended into straight or winding galleries up to 1 inch in length which were enlarged terminally by feeding. As many as four adults were found in a single gallery and up to 17 adults per square inch of cambium in narrowly separated niches and galleries. It appears that some of the niches are extended in the following spring as sites for egg laying. In the field on May 10 hylesinus adults were found in pairs in small niches in the centre of small areas of discoloured bark in trees felled July 13, July 28, and August 11, 1954. By May 26 these niches had been extended into full length galleries and contained eggs.

Eight samples of forest duff, each one square foot in area, taken periodically from August 12 to November 23 from the vicinity of infested and uninfested slash yielded no adults. It seems that adults overwinter in the niches described above since examination on November 23 of the duff placed in the cages on August 12 contained no adults despite the large numbers in the cages.

The results of the study described here support and complement those obtained by Harris (1954). The differences between the results of these two studies and the results of the studies by Hopping (1928) and Chamberlin (1939) may be due to climatic factors.

Summary

A study of the life history and habits of the Douglas-fir hylesinus, *Pseudohylesinus nebulosus* (Leconte), was made near Lumby, British Columbia. The results indicated that the Douglas-fir hylesinus in the interior of the Province has a 1-year life-cycle with one brood and one generation per year. Young adults overwinter in small, irregular niches excavated in the bark.

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Two New Species of Aphididae Collected in Western Canada (Homoptera)[1]

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This paper includes descriptions of a new species of *Cinara* and one of *Micromyzus*.

The species of *Cinara* belongs to the species group in which the base of the cornicle bears both heavy and fine setae. In other members of this group the heavy and fine setae are evenly distributed over the surface of the base of the cornicle, but in the species described here the fine setae are clustered around the orifice and the heavy ones are closer to the margin of the base than in related species (Fig. 4). Another difference is that the dorsum of the abdomen is heavily sclerotized rather than having the small, isolated sclerites characteristic of the other members of this species group.

The species of *Micromyzus* was collected on onions that were imported into Canada from California and stored in a warehouse. It belongs to a small group of species in which the veins of the wings are clouded, and of which several species have been recorded from onions in the Holarctic region. The relationships of these species are most readily indicated by means of the following key:—

1. Radial sector originating about middle of stigma; veins narrowly bordered with dark pigment; first segment of hind tarsus usually with two setae 2
   Myzus ascalonicus Doncaster
   Radial sector originating near apex of stigma; veins broadly bordered with dark pigment; first segment of hind tarsus usually with three setae 2
2. Third antennal segment of the alates with fewer than 30 secondary sensoria .....
   Micromyzus oliveri Essig
   Third antennal segment of the alates with more than 30 secondary sensoria 3
3. Fourth antennal segment of the alates with fewer than 20 secondary sensoria .....
   Micromyzus violae (Pergande)
   Fourth antennal segment of the alates with 20 or more secondary sensoria 4
4. Unguis of the apterae less than four times as long as base of sixth antennal segment; fourth segment of the alates with 30 to 40 secondary sensoria .....
   Micromyzus formosanus (Takahashi)
   Unguis of the apterae more than four times as long as base of sixth segment; fourth segment of the alates usually with about 50 secondary sensoria but sometimes with as few as 40 or as many as 60 ..... *Micromyzus fuscus* n. sp.

Cinara sclerosa n. sp.

Figs. 1-4

Apterous viviparous female

Colour of living specimen unknown. Colour in alcohol: Body dark brown; antenna pale brown to yellow except apices of segments III, IV, and V and all of VI, which are dark brown; legs dark brown except the middle portions of the tibiae, which are pale; rostral segments III, IV, and V dark brown, segment II pale except for two or three incomplete dark-brown bands.

Head sparsely covered with straight, sharply pointed setae equal in length to diameter of base of third antennal segment. Lengths of antennal segments as follows: I, 0.1 mm.; II, 0.13 mm.; III, 0.55 mm.; IV, 0.25 mm.; V, 0.3 mm.; VI, 0.1 mm. Primary sensoria without ciliated margins and distributed as follows: III, 1-2; IV, 1-3; V, 2; VI with one large one and an adjacent cluster

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of six smaller ones. Antennae with pointed setae equal in length to or slightly shorter than the basal diameter of the segment. Length of apical rostral segments as follows: III, 0.225 mm.; IV, 0.20 mm.; V, 0.10 mm.; chaetotaxy as in Fig. 3.

Mesosternal papilla present. Legs with sharply pointed setae, those of the tibiae shorter than half the width of the segment. Setae of first tarsal segment on each leg fine and pointed, except for a median, ventral, apical one which is blunt, shorter than the others, and on an integumentary papilla (Fig. 2). Length of hind tibia, 2.6 mm.

Each segment of the abdomen with a large, rectangular sclerite covering most of the dorsum. These sclerites may be wholly or partially fused in the intersegmental region, and those of the first three abdominal segments may be partially divided by a median suture. Venter of abdomen without sclerotization other than ventral plate. Dorsal abdominal setae straight, short, sparsely distributed, sharply pointed, and arranged in two irreguar rows on the first seven segments, a single row on the posterior margin of the transverse sclerite of the eighth. Length of the dorsal abdominal setae, 0.025 mm. Setae on venter of abdomen variable in length but longer, finer, and more numerous than the dorsal abdominal setae. Base of cornicle up to 0.6 mm. in diameter, with irregular broken edges and with two types of setae (Fig. 4).

Integument smooth except for spiculose imbrications on apices of third, fourth, and fifth and whole of sixth antennal segments and on dorsal sclerites of seventh and eighth abdominal segments. Cauda and anal plate heavily spiculose as is normal for the genus.

Length of largest specimen, 3.5 mm.

This species appears to have no close relatives. The combination of the chaetotaxy of the cornicles and the intense sclerotization of the dorsum of the abdomen readily distinguish it from other species.

Holotype, apterous viviparous female, Fawn P.O., British Columbia, June 23, 1952 (D. A. Ross), collected on *Pinus contorta*. In the Canadian National Collection, type number 6372.

Paratypes, same data as for holotype.

Micromyzus fuscus n. sp.

Figs. 5, 6, 11

Apterous viviparous female

Colour of living specimen unknown.' Colour in alcohol: Body brown; antenna pale except for apex of segment IV and all of V and VI, which are fuscous; coxae, trochanters, femora, and tarsi dark brown; tibiae pale with fuscous to dark brown apices; rostrum fuscous.

Dorsum of head sparsely covered with short, apically expanded setae (Fig. 11). Frontal tubercles well developed, the inner margin of each with an expanded, rounded, rugose, projection that bears three small, apically expanded setae. Antenna slightly longer than the body and without secondary sensoria. Primary sensoria with heavily ciliate margins. Antenna sparsely covered with short, apically expanded setae equal in length to one-fourth to one-third of basal

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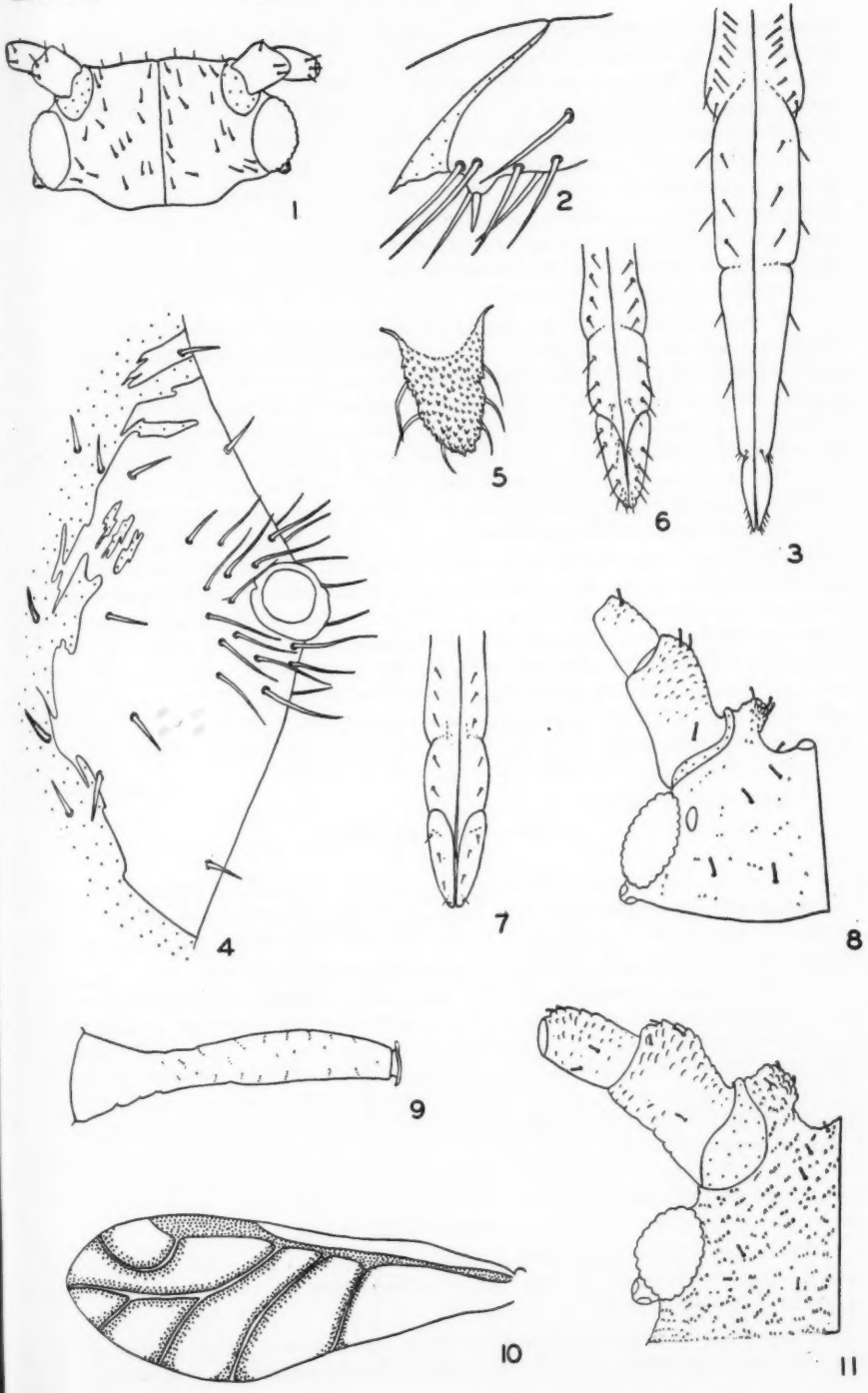
Figs. 1-4. *Cinara sclerosa* n. sp. 1, dorsal chaetotaxy of head; 2, ventral setae of apex of left hind tarsi; 3, chaetotaxy of rostrum; 4, left cornicle and cornicle base.

Figs. 5-11. *Micromyzus fuscus* n. sp. 5, cauda of apterous viviparous female; 6, chaetotaxy of rostrum of alate viviparous female; 7, chaetotaxy of rostrum of apterous viviparous female; 8, dorsum of left side of head of alate viviparous female; 9, cornicle of apterous viviparous female; 10, left forewing; 11, dorsum of left side of head of apterous viviparous female.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diameter of third antennal segment. Lengths of antennal segments as follows: I, 0.15 mm.; II, 0.08 mm.; III, 0.65 mm.; IV, 0.5 mm.; V, 0.5 mm.; VI, 0.15 mm. + 0.75 mm. Rostrum reaching beyond the middle coxa. Lengths of apical rostral segments; III, 0.10 mm.; IV + V, 0.125 mm. Rostral segment IV plus V the same length as the hind tarsus; chaetotaxy as in Fig. 6.

Prothorax with a dorsolateral and a lateral tubercle on each side. Metathorax with a lateral tubercle. Coxae and trochanters with a few acute setae; tibiae with short, apically expanded setae except at the apices, where they are acute and about equal in length to half the apical diameter of the tibiae. First tarsal segment of the first two pairs of legs each with three preapical ventral setae, each of the last legs with two such setae. Length of hind tibia 1.38 mm.

Dorsum of abdomen with short, apically expanded setae arranged in single irregular rows on each of the first eight segments. Setae of venter of abdomen acute, slightly longer and more numerous than the dorsal setae. A small, diffusely pigmented post-siphuncular sclerite on each side. Eighth segment with a narrow, diffusely pigmented transverse sclerite. Venter of abdomen without sclerites other than the ventral plate. Cornicles expanded apically and with basal wrinkles (Fig. 9). Length of cornicles, 0.38 mm. Cauda elongate with three long, acute setae on each side. Length of cauda, 0.15 mm.; width at base, 0.12 mm. (Fig. 5). Abdomen without lateral tubercles.

Integument: Antenna with untoothed imbrications that are better developed and more numerous on the ventral surface; dorsum and venter of head coarsely spiculate; rostrum smooth; dorsum of thorax smooth, venter coarsely spiculate; coxae and trochanters with spiculose imbrications, femora and tarsi with a few untoothed imbrications, tibiae smooth; dorsum of abdomen with very fine transverse ridges that tend to anastomose on anterior segments to form a recticulate pattern; coarse, spiculate imbrications on post-siphuncular sclerites, and on dorsal sclerites of seventh and eigth abdominal segments and ventral plate, and finer, spiculate imbrications elsewhere on venter of abdomen.

Length up to 2.0 mm.

Alate viviparous female

Figs. 7, 8, 10

Colour of living material unknown. Colour in alcohol: Antenna fuscous, the apices of the segments darker; head and thorax black; veins of the wings bordered with black; legs pale except for the tarsi, the apices of femora, and the tibiae, which are fuscous to dark brown; abdomen dark brown.

Dorsum of head sparsely covered with short, apically expanded setae (Fig. 8). Frontal tubercles well developed, each with its inner surface bearing three apically expanded setae. Antenna slightly longer than the body, with circular and subcircular secondary sensoria arranged as follows: III, 40-57; IV, 20-25; V, 1-5. Primary sensoria with heavily ciliate margins, arrangement normal for genus. Antennal setae the same as in apterous viviparous female. Lengths of antennal segments: I, 0.12 mm.; II, 0.1 mm.; III, 0.7 mm.; IV, 0.5 mm.; V, 0.4 mm.; VI, 0.18 mm. + 0.72 mm. Rostrum reaching to middle coxa; lengths of apical segments as follows: III, 0.1 mm.; IV + V, 0.125 mm.; segment IV + V the same length as the hind tarsus; chaetotaxy as in Fig. 7.

Prothorax with a single dorsolateral tubercle on each side. Venation of wings (Fig. 10) normal for the genus. Chaetotaxy of the appendages as in apterous viviparous female.

Chaetotaxy of abdomen essentially as in apterous viviparous female except that the setae are slightly shorter. A small, diffusely pigmented post-siphuncular

sclerite; a narrow, well-pigmented sclerite on each of the torsa of segments I and II; a single, narrow rectangular sclerite on segment III; sclerites of segments IV and V fused to form a large, almost square sclerite; sclerite of segment VI narrow, well pigmented, and sometimes partially fused to the posterior margin of the composite sclerite of segments IV and V. Segments VII and VIII with narrow, diffusely pigmented sclerites. Venter of abdomen without sclerites other than the ventral plate. Segments I-V each with a circular pigmented sclerite near each spiracle. Cornicles as in apterous viviparous female. Length of cornicles, 0.31 mm. Cauda as in apterous viviparous female but more slender. Length of cauda, 0.12 mm.; width at base, 0.08 mm. Lateral abdominal tubercles absent.

Integument: First and second antennal segments with imbrications, a few of which are faintly spiculose; third segment with a few, scattered, untoothed imbrications; segments IV, V, and VI with many untoothed imbrications; dorsum of head with a few fine spicules; spicules of frontal tubercles more numerous and more conspicuous than on the dorsum of the head (Fig. 8); coxae, trochanters, femora, apices of tibiae, and the whole of the tarsi except the claws with sparsely distributed, untoothed imbrications; thoracic segments smooth; dorsa of abdominal segments I-V smooth except for transverse striations similar to those of apterous viviparous female, dorsa of segments VI-VIII with distinct spiculose imbrications; whole of venter of abdomen with spiculose imbrications; cauda and anal plate as in apterous viviparous female.

Length up to 2.0 mm.

This species is very closely related to *M. formosanus* (Tak.), from which it differs in the relative lengths of the antennal segments of the apterae and the number of secondary sensoria in the alates, as indicated in the key above.

Holotype, alate viviparous female, Saskatoon, Sask., June 8, 1955 (H. MacDonald), collected on stored onions. In the Canadian National Collection: type number, 6373.

Morphotype, apterous viviparous female, same data as for holotype.

Paratypes, same data as for holotype.

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Restriction and Revision of the Genus *Diastictis* Hübner (Lepidoptera: Pyralidae)[1]

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The genus *Diastictis* Hübner (1818:21) has as monotype *D. argyralis* Hübner. Warren (1892:434), neglecting the original publication, proposed *Anomostictis* as a substitute name for *Diastictis* Hübner, 1825, which is preoccupied by the geometrid genus *Diastictis* Hübner, 1823. Warren's selection of *argyralis* as type of *Diastictis* Hübner, 1825, is an effective type designation for *Anomostictis*, which therefore is a junior objective synonym of *Diastictis* Hübner, 1818.

Hampson (1896, 1898), like Warren, considered *Diastictis* unavailable in Pyralidae, and he placed its species in *Bocchoris* Moore. Fernald (1902:374) recognized the priority of *Diastictis* and sank *Bocchoris* as a synonym. However, *Bocchoris* of Hampson or *Diastictis* of Fernald is actually an extremely heterogeneous assemblage. Of the numerous species from all over the world listed by Hampson (1898) or subsequently described, only four—*argyralis* Hübner, *ventralis* Grote and Robinson, *fracturalis* Zeller, and *caecalis* Warren—appear to be correctly placed in *Diastictis*. The types of *Bocchoris* Moore, *Chabula* Moore, *Didymostoma* Warren, and *Aediodina* Strand are all generically distinct from *Diastictis* and from one another; also a number of undescribed genera are represented.

The restricted genus *Diastictis* appears to be mainly North American; one species extends to Cuba and probably several range into Mexico. The species have usually been listed as three: *argyralis*, with *ventralis* as a variety, *fracturalis*, and *caecalis*. Some years ago Dr. J. McDunnough made genitalic dissections which showed that *ventralis* was specifically distinct from *argyralis* and that additional species were recognizable; however, he did not pursue the matter further. Since his preliminary investigation a great deal of additional material has become available, partly through accessions to the Canadian National Collection and partly through loans from a number of correspondents. Study of this reveals the existence of ten species, six of which are described herein as new.

The species are all very similar in maculation, and have been much confused in collections. There are two main facies: that with the silver spots small or obsolete, found in *argyralis*, *ventralis*, *caecalis* and one new species, and that with the silver spots large, prominent, and often partly coalescent, found in *fracturalis* and five new species. Extreme variants in the two groups approach one another in size of spots. In some of the species the ground colour varies from orange-yellow to dark fuscous. At least in the Southeastern United States this variation appears to be seasonal, winter and early spring specimens being paler, summer and autumn specimens being darker.

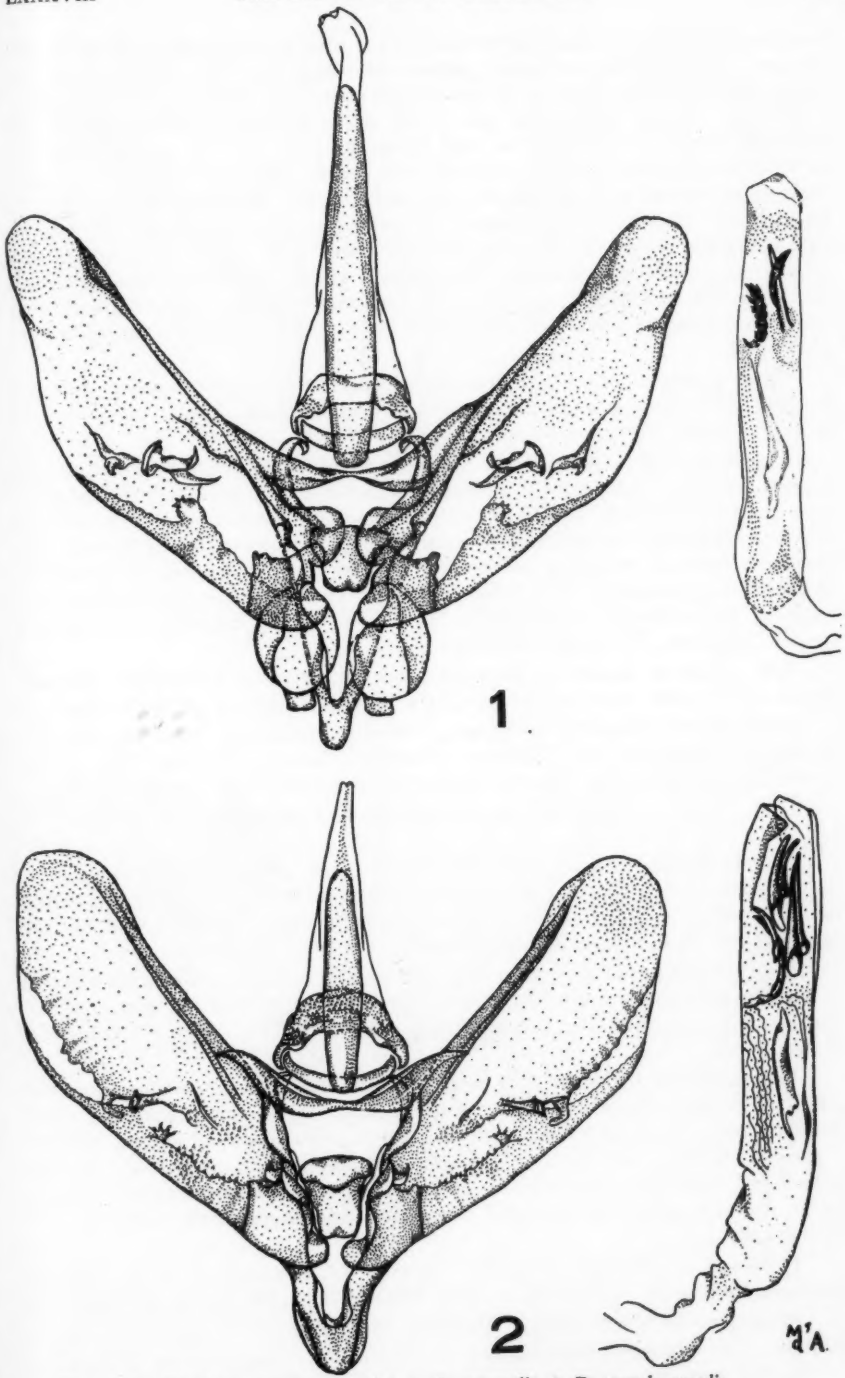
Diastictis argyralis (Hübner)

Figs. 1, 12, 21, 22

Palpita argyralis Hübner, 1808:5, validated by appearance of Hübner [1809]-[1813], Pl. [20].
Diastictis argyralis, Hübner, 1818:21.
Botys argyralis, Guenée, 1854:341.
Anomostictis argyralis, Warren, 1892:434.
Bocchoris argyralis, Hampson, 1898:653.

Ground colour varying from clear orange-yellow to dark fuscous, the former colour occurring in winter specimens, the latter in summer ones. Colour of

[1]Contribution No. 3421, Entomology Division, Science Service, Department of Agriculture, Ottawa, Canada.
[2]Senior Entomologist.



Figs. 1, 2. *Diastictis* spp., ♂ genitalia: 1, *D. argyralis*; 2, *D. pseudargyralis*.

head, thorax and fore wing clearer and darker than that of hind wing and under surface. Under surface of labial palpus and a line on either side of frons and vertex silvery-white. Fore wing above with minute or obsolescent silvery spots, as follows: a round antemedial spot below cell; sometimes a minute spot in cell above it; a round or subquadrate spot in outer fourth of cell; a spot below end of cell, arrowhead-shaped or quadrate with outer edge emarginate; a series of three submargined spots in cells M_2, M_3 and Cu_1, the last displaced considerably basad of the others; a subapical series of three spots just beyond end of cell. In pale specimens the silvery spots usually with black rims. Hind wing with traces of a sinuate fuscous postmedial line, ground colour somewhat darker beyond the line. Underside with markings of upper side faintly repeated, and with an obscure dusky postmedial line on fore wing as well as on hind wing. Expanse: 22-27 mm.

Male genitalia: valve slender, with outer spine ventro-distally directed. Penis armed with a large, densely spinose cornutus, flanked by a group of two or three simple, curved cornuti.

Female genitalia: ductus with an almost symmetrical, barrel-shaped, heavily sclerotized collar, followed by a short, somewhat less strongly sclerotized zone, then by a constriction, delimiting an expanded zone, deflected to the left, and heavily scobinated and sclerotized, most strongly so along the right-hand side; this zone inserted obliquely on ventral surface of an expanded, membranous, scobinate, longitudinally folded and anteriorly tapering zone; the latter in turn entering the globular, membranous, scobinate bursa. Signum oval, trough-shaped, scobinate, its margins diffuse.

The specimen shown in Fig. 20 is an almost exact match for Hübner's figure, and I think there can be no doubt about the identity of the species.

Material examined.—23 specimens, from the following localities:—*Florida*: Portland; Lakeland; Lutz; Stemper; *Alabama*: Cowarts; *Georgia*: [no precise locality]; *South Carolina*: Myrtle Beach; *North Carolina*: [no precise locality].

***Diastictis pseudargyralis*, new species**

Figs. 2, 13, 23-25

Closely similar to *D. argyralis*, and with the same seasonal dimorphism. Fore wing shorter and with outer margin less oblique than in *argyralis*; silvery spots on the average smaller, rarely margined with fuscous; posterior spot of submarginal row less strongly displaced basad. ,Expanse: 19-26 mm.

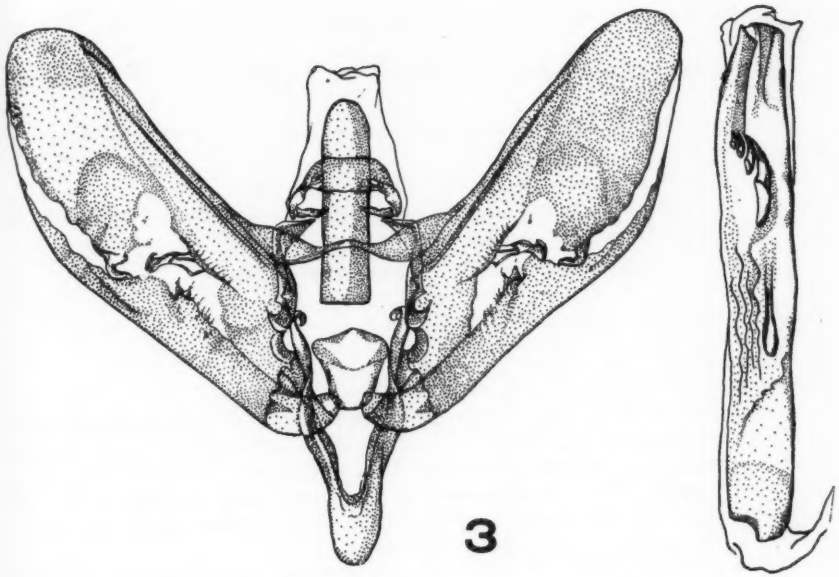
Male genitalia as in *argyralis* except for cornuti, which consist of two groups of slender, straight or slightly curved, thorn-like spines, the left group a little proximad of the right, the left consisting usually of two, the right usually of three, spines.

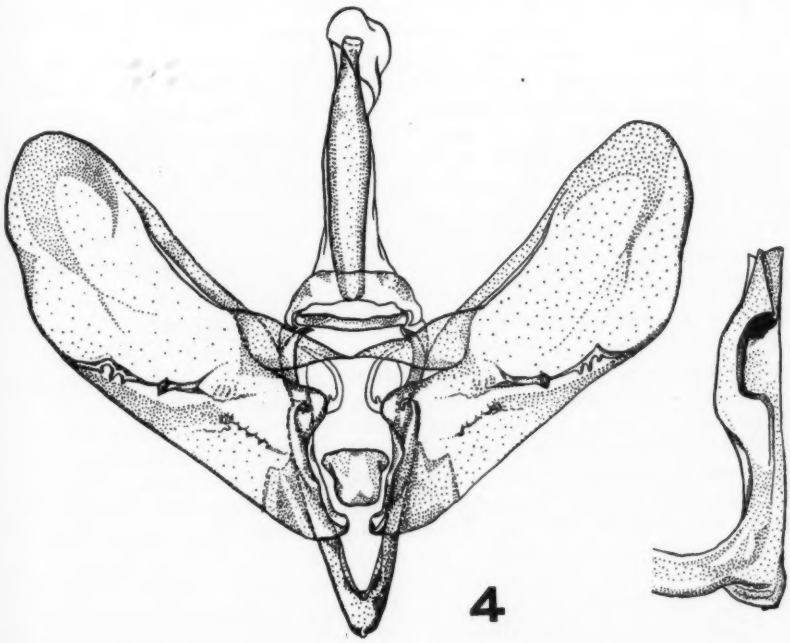
Female genitalia: ductus with posterior part narrow and tapering anteriorly, rather uniformly sclerotized except in the most strongly constricted part, which is membranous; anterior to the zone of greatest constriction an abrupt, rounded expansion leading into a long, broad, cylindrical tube, posteriorly heavily sclerotized, anteriorly membranous; this tube opening directly into the globular bursa; signum wider, less strongly sclerotized, and more finely scobinate than in *argyralis*.

Holotype, ♂, Stemper, Fla., Oct. 14, 1912, G. Krautwurm, in the Carnegie Museum, Pittsburgh. Allotype, ♀, same locality, Sept. 19, [year?], ex Engel Coll.

Paratypes.—In the Carnegie Museum, Pittsburgh:—7 ♂♂, 3 ♀♀ from: Stemper, Fla., and Opelousas, La.

In the American Museum of Natural History, New York:—2 ♂♂, 5 ♀♀,





Figs. 3, 4. *Diastictis* spp., ♂ genitalia: 3, *D. ventralis*; 4, *D. fracturalis*.

from: Florida (Mrs. Slosson); Valdosta, Ga.; Cowarts, Ala.; Maxton, N.C.; and Hattiesburg, Miss.

In the Academy of Natural Sciences, Philadelphia:—2 ♂ ♂, from Whistler, Ala.

In the California Academy of Sciences, San Francisco:—1 ♂, from Gastonia, N.C.

In the British Museum (Natural History):—2 ♂ ♂, 3 ♀ ♀, and 1 unsexed from Georgia or without locality.

In the Zoological Museum, Berlin:—2 ♀ ♀, Georgia.

In the Canadian National Collection:—2 ♂ ♂, 1 ♀: Titusville, Fla.; Opelousas, La.; and without locality; type No. 6304.

Diastictis ventralis (Grote and Robinson)

Figs. 3, 14

Botys ventralis Grote and Robinson, 1867: 21, Pl. 2, Fig. 23.
Botis ventralis, Zeller, 1872: 508.
Bocchoris argyralis (var.) *ventralis*, Hampson, 1898: 653.
Diastictis argyralis ventralis, Fernald, 1902: 374.

Similar in external appearance to *argyralis*, but with the antemedial spots absent in all specimens examined, the outer cell-spot often absent, and the postmedial, submarginal, and subapical spots small or minute. Ground colour varying from orange-yellow to olivaceous fuscous, but rarely as dark as in dark forms of *argyralis* and *pseudargyralis*; clear orange-yellow specimens appear mainly in the southernmost parts of the range.

Male genitalia: spine of valve directed ventrad and mesad or somewhat basad; penis with one group of cornuti, consisting of a regularly diminishing transverse row of from two to four claw-like spines.

Female genitalia: ductus with an oblong sclerite in one wall near ostium; anterior to this is a slightly constricted membranous zone, followed by a wedge-shaped, sclerotized, scobinated expansion, leading into a long, broad, cylindrical, membranous, scobinated tube of uniform width, opening rather gradually into the globular, membranous bursa; signum trough-shaped, parallel sided.

This is the most northerly species, and the commonest in the eastern United States. I have no information on the early stages.

I recognize two subspecies. The populations of the southern United States may ultimately need further division, but the material available is too scanty for an adequate treatment.

Diastictis ventralis ventralis (Grote and Robinson)

Figs. 26-29

Outer margin of fore wing oblique; silvery spots often fairly large, almost always bordered outwardly by an obscure, fuscous, postmedial line.

Material examined.—185 specimens, from the following localities:—*Florida*: Avon Park; *Alabama*: Gurley; *Mississippi*: A. and M. College; *Louisiana*: Opelousas; *Texas*: Georgetown; *North Carolina*: Raleigh; *Virginia*: Salem; *Tennessee*: East Ridge; *District of Columbia*: Washington; *Pennsylvania*: Philadelphia; Shawville; Homebrook; Mt. Airy; Elwyn; North Wales; Roxborough; Cresson; Finleyville; Pittsburgh; Oak Station; Jeannette; Cityview; Sinking Spring; *New Jersey*: Paterson; Lake Hopatcong; Ramsey; Westwood; Alpine; Rockaway; Clementon; New Brunswick; Springdale; Mendham; S. Lakewood; *New York*: Staten Island; Katonah; New Windsor; New York; Long Island; *Connecticut*: Mystic; Putnam; *Rhode Island*: Elmwood; *Massachusetts*: Hyde Park; Framingham; *Maine*: Bar Harbor; Kennebunkport; *Ohio*: Cincinnati; *Ontario*: Port Colborne.

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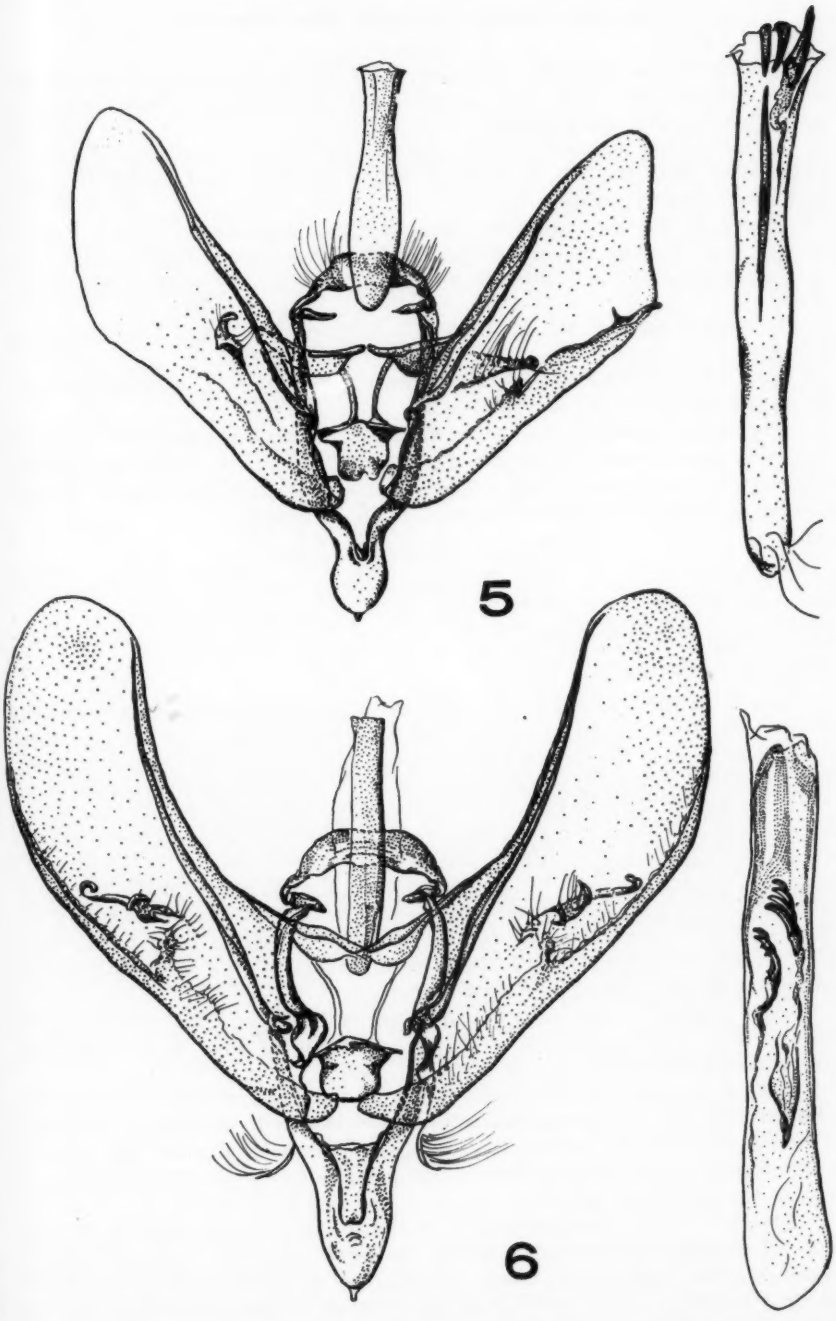


Figs. 5, 6. *Diastictis* spp., ♂ genitalia: 5, *D. holguinalis*; 6, *D. albovittalis*.

***Diastictis ventralis seamansi*, new subspecies**

Figs. 30-32

Simbilar to the nominate subspecies, but with the fore wing on the average a little narrower and with outer margin more oblique; spots minute, and postmedial band absent or obsolescent.

Holotype, ♂, Lethbridge, Alta., June 7, 1929, H. L. Seamans; allotype, ♀, Lethbridge, Alta., June 22, 1929, J. H. Pepper; both in the Canadian National Collection, type No. 6305.

Paratypes.—In the Canadian National Collection:—14 ♂♂, 3 ♀♀, from: Beulah, Man.; Harlan, Sask.; Lethbridge, Alta.; Rayleigh and Oliver, B.C.

In the Academy of Natural Sciences, Philadelphia:—1 ♂, from Clear Creek, Colo.

In the Colorado A. and M. College Collection:—2 ♂♂ and 1 unsexed from "Colo.".

In the British Museum (Natural History), London:—2 ♂♂ from: Boulder, Colo., and "West U.S.A., Walsingham".

I refer the following two specimens doubtfully to this subspecies: a broad-winged female in the Los Angeles County Museum, from Ash Creek Ranch, Graham Co., Ariz.; and a yellow-winged female in the University of Kansas Collection, from New Mexico, collected by F. H. Snow.

***Diastictis fracturalis* (Zeller)**

Figs. 4, 15, 33-35

Botis fracturalis Zeller, 1872: 509, Pl. III, Fig. 16.
Anomostictis fracturalis, Warren, 1892: 434.
Bocchoris fracturalis, Hampson, 1898: 653.
Diastictis fracturalis, Fernald, 1902: 374.

Upper surfaces of head, thorax and fore wing varying from light orange-tan through olivaceous to dark fuscous; hind wing above translucent, varying from white to fairly dark fuscous with darker veins, outer margin and postmedial band. Silver spots of fore wing much larger and more conspicuous than in the three preceding species, arranged as follows: an oblique subbasal streak or spot below cell, frequently entering it; an anvil-shaped spot below end of cell and usually a round or quadrate spot in cell near end, these two often fused to form an irregular, oblique band; a bar parallel to the margin, representing the three submarginal spots of *D. argyralis* and a somewhat oblique bar representing the three subapical spots, these two bars occasionally connected by a streak along M_2. Underside uniformly light brownish or fuscous, with the markings of the upper side showing through as diffuse paler areas.

Male genitalia: spine of valve directed ventro-distad, not ventro-mesad; cornuti in a single group, consisting of a diminishing row of two or more claw-shaped spines, much as in *D. ventralis*.

Female genitalia: ductus heavily sclerotized on ventral surface for a considerable distance, the anterior half of the sclerotized zone scobinated; remainder of ductus membranous, scobinated, strongly inflated on right side just anterior to sclerotized zone; bursa globular, signum trough-shaped, scobinated, larger than in the preceding species.

This is the most variable species of the genus, and, although there seem to be geographical differences in norms, the whole gamut of variation is represented in most parts of the range. There is a high proportion of specimens with small spots in Texas, and of pale specimens in Arizona, but there is nothing approaching a degree of differentiation that would justify the separation of subspecies. I can see no clear seasonal separation between pale and dark individuals.

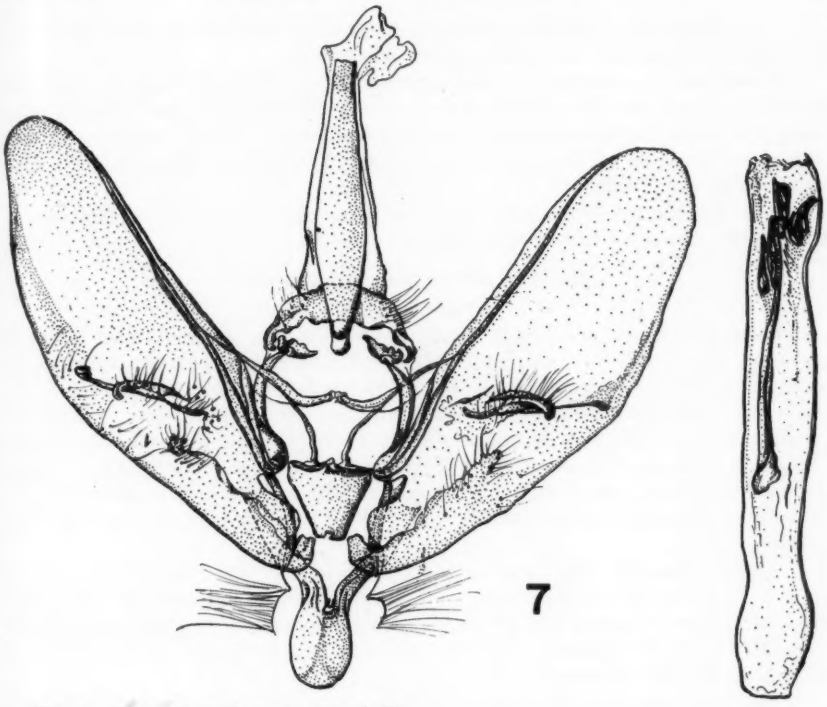


Fig. 7. *Diastictis viridescens*, ♂ genitalia.

Material examined.—225 specimens, from:—*Louisiana*: Opelousas; *Texas*: Bexar Co.; Sonora; Montague Co.; Georgetown; Comfort; Brownsville; Karner; Fort Davis; *Arkansas*: Hope; *Oklahoma*: Lugert; Cheyenne; *Colorado*: Akron; *Utah*: Provo; *New Mexico*: Socorro; Albuquerque; Silver City; *Arizona*: Patagonia; Tucson; Redington; Greaterville; Madera Canyon; Globe; Oracle; Huachuca Mts.; Baboquivari Mts.; Mouth of Rock Canyon, Sta. Catalina Mts., 3000 ft.; Yuma; *California*: Carmel; Rancho la Sierra, Riverside Co.; Exeter; Riverside; Alma; Dana Point; Los Angeles; Laguna Beach; Glendale; San Diego; Santa Monica; Burbank; Cajon Pass; Cajon Wash; Bouquet Canyon; Baldwin Hills; Greenhorn Mts.; *Baja California*: Cape San Lucas; *Sonora*: La Choya; "N. Sonora", H. K. Morrison; *Guerrero*: Amula, 6000 ft.; *Vera Cruz*: Jalapa; Tuxpan; [*State Uncertain*]: Jalisco, July, Schumann; *Guatemala*: [no precise locality]; "*Sud Amer.*, 1872" [ex coll. Zeller, locality probably erroneous].

***Diastictis holguinalis*, new species**

Figs. 5, 20, 36

Closely similar in external appearance to *D. fracturalis*, but considerably smaller in size (expanse 18-21 mm.); ground colour of fore wing in all specimens examined dark olivaceous-fuscous; variation in size of silver spots about as in Texas *fracturalis*. Male genitalia with cornuti shorter and more nearly equal in size than in *fracturalis*, and in particular without a very long and strongly curved cornutus at one end of the series. Female genitalia with a pronounced bulge in the sclerotized portion of the ductus, on the opposite side to the bulge in the membranous portion; the latter bulge much smaller than in *fracturalis*.

The apparently constant differences in genitalia lead me to treat this form as a species rather than as a subspecies of *fracturalis*.

Holotype, ♂, allotype, ♀, and nine paratypes, all from Holguin, Cuba, in the British Museum (Natural History), London. Three paratypes with the same data, No. 6306 in the Canadian National Collection. Two paratypes in the American Museum of Natural History, New York, from Biscayne Bay, Fla., collected by Mrs. Slosson.

The Florida specimens both have the silver spots smaller than those of all except one of the 14 Cuban specimens.

***Diastictis albovittalis*, new species**

Figs. 6, 18, 37

Fore wing dark olivaceous brown, disc broadly suffused with fuscous; markings much as in *D. fracturalis*, but mat white, not silvery. Hind wing strongly infuscated, with rather distinct fuscous postmedial and terminal lines; the space between these lines darker than the rest of the wing. Underside medium brown, markings of upper side weakly repeated. Expanse: 20-28 mm.

Male genitalia: spine of valve directed ventro-mesad, with only a slight caudad component; penis with two groups of cornuti, one a little behind and to one side of the other, each consisting of a row of three or four curved, claw-like spines.

Female genitalia: ductus with a rather long sclerotized zone near ostium, then with a narrow unsclerotized band, followed by a scobinated, sclerotized expanding zone, merging into an unsclerotized, scobinated, longitudinally folded tube, this in turn expanding into the globular bursa; signum ovate, shallowly depressed, heavily scobinate.

Holotype, ♂, Puebla, Puebla, Mexico, July 13, 1918, C. C. Hoffmann; Allotype, ♀, San Angel, D.F., Mexico, July 9, 1913, C. C. Hoffman; both in the American Museum of Natural History, New York.

Paratypes.—In the American Museum of Natural History, New York: 2 ♂ ♂, Puebla, Puebla, Mexico.

In the British Museum (Natural History), London: 1 ♂ vic. Cordoba, Mex. (ex coll. R. Oberthür).

In the Bavarian State Zoological Collection, Munich: 1 ♂, 1 ♀, Vulcan Colima, Mex.

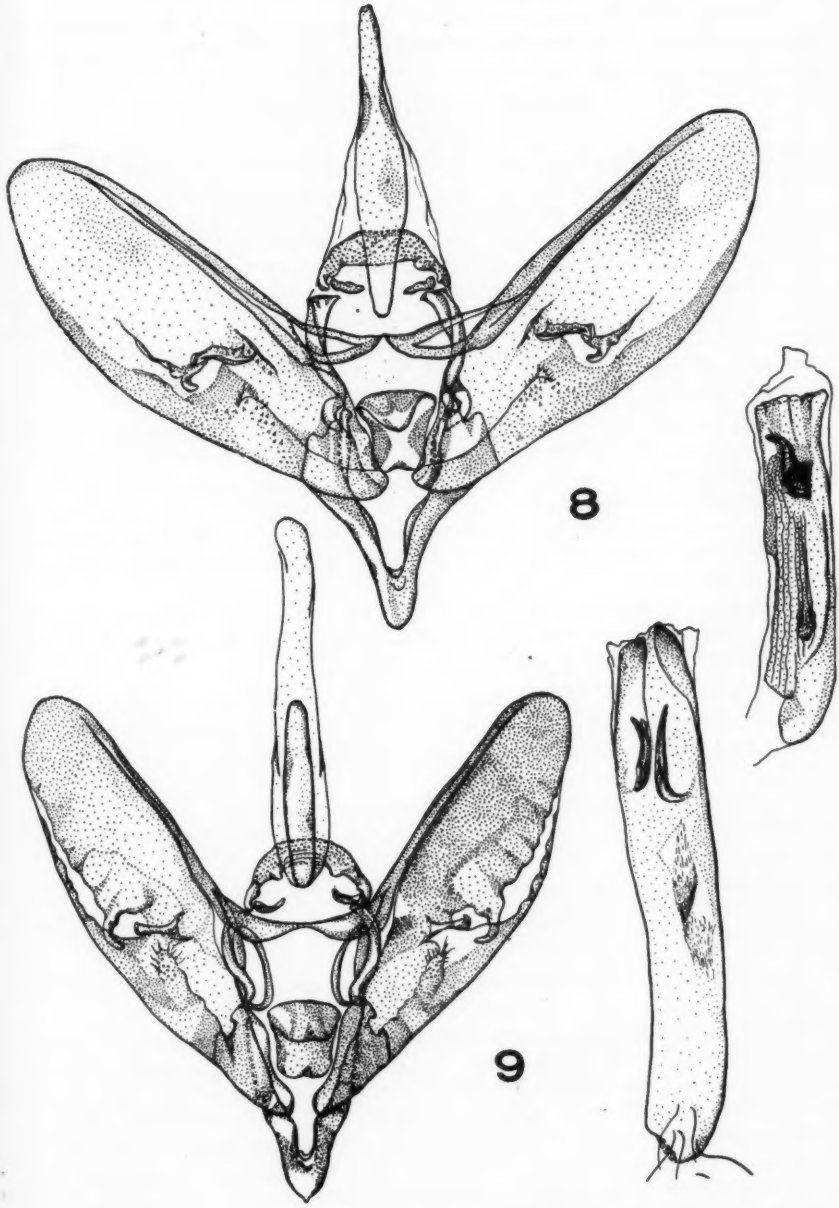
In the Canadian National Collection: 1 ♂, Puebla, Puebla, Mex.; 1 ♂, Vulcan Colima, Mex. Type No. 6307.

***Diastictis viridescens*, new species**

Figs. 7, 38

General appearance as in *D. fracturalis*, but wings proportionally narrower. Fore wing clear greenish olive, paler along inner margin and suffused with fuscous near margins of silvery spots. Basal silvery dash narrow and almost parallel to inner margin; no spot at base of cell, but a round spot in outer fourth; spot below end of cell conspicuously anvil-shaped, proportionally longer than in *fracturalis*, the upper extensions greatly attenuated, extending from origin of Cu_2 nearly to submarginal band; the latter connected to the oblique subapical band by a stria along M_2. Hind wing greyish white, with weak fuscous postmedial and terminal lines. Underside whitish buff, disc or fore wing suffused with fuscous, markings of upper side faintly indicated. Expanse: 29 mm.

Male genitalia: closely similar to those of *D. albovittalis*, but with the distal group of cornuti much larger in proportion to the proximal group, the groups containing five and three cornuti, respectively.



Figs. 8, 9. *Diastictis* spp., ♂ genitalia: 8, *D. robustior*; 9, *D. sperryorum*.

Holotype, ♂, Palmerlee, Ariz., in the British Museum (Natural History), London.

I believe that additional material of this species exists in the United States National Museum, but I have unfortunately not been able to study critically the series in that institution.

***Diastictis robustior*, new species**

Figs. 8, 16, 39

Noticeably larger and more robust than the other species of the genus. Fore wing yellowish to olivaceous tan, with large silver spots disposed as follows: a large broad vitta below and extending into the cell near the base; a small round or quadrate spot near outer end of cell; an anvil-shaped spot below outer end of cell, much less constricted medially than in *viridescens*; the three spots of the submarginal row quadrate, discrete in most specimens; the three subapical spots fused into an oblique vitta, broadest posteriorly. Hind wing white, with weak grey or yellowish suffusion near termen. Underside white, suffused on fore wing with grey or yellowish, maculation of upper side weakly repeated. Expanse: 29-36 mm.

Male genitalia: spine of valve short, far removed from margin, directed obliquely basad; penis with a single very stout, twisted, hook-like cornutus.

Female genitalia: ductus with a rather narrow sclerotized collar, followed by a membranous zone, then by a long, wedge-shaped sclerite, extending far down the inflated, scobinate, membranous, longitudinally folded anterior part of the ductus; bursa globular, with a rather large, broadly ovate, shallowly depressed signum.

Holotype, ♂, Dewey Lake, Cherry Co., Nebr., June 12, 1929, R. A. Leussler (ex coll. John L. Sperry), No. 6308, C.N.C. Allotype, ♀, Durango, Colo., Oslar, in the British Museum (Natural History), London.

Paratypes.—In the British Museum (Natural History), London:—5 ♂♂, 4 ♀♀, from: Durango and Denver, Colo.; Prescott and Huachuca Mts., Ariz.

In the Academy of Natural Sciences, Philadelphia:—1 ♂, 1 ♀, from Clark Co., Kans.

In the California Academy of Sciences, San Francisco:—2 ♂♂, from: "Ariz.", Koebele Coll., Dry Cn. Sands Ranch, S.E. end Whetstone Mts., Cochise Co., Ariz.

In the University of Kansas Collection:—1 ♂, Hamilton Co., Kans.

In the Canadian National Collection:—1 ♂, 1 ♀, from:—Durango, Colo.; Huachuca Mts., Ariz., type No. 6308.

***Diastictis sperryorum*, new species**

Figs. 9, 17, 40-42

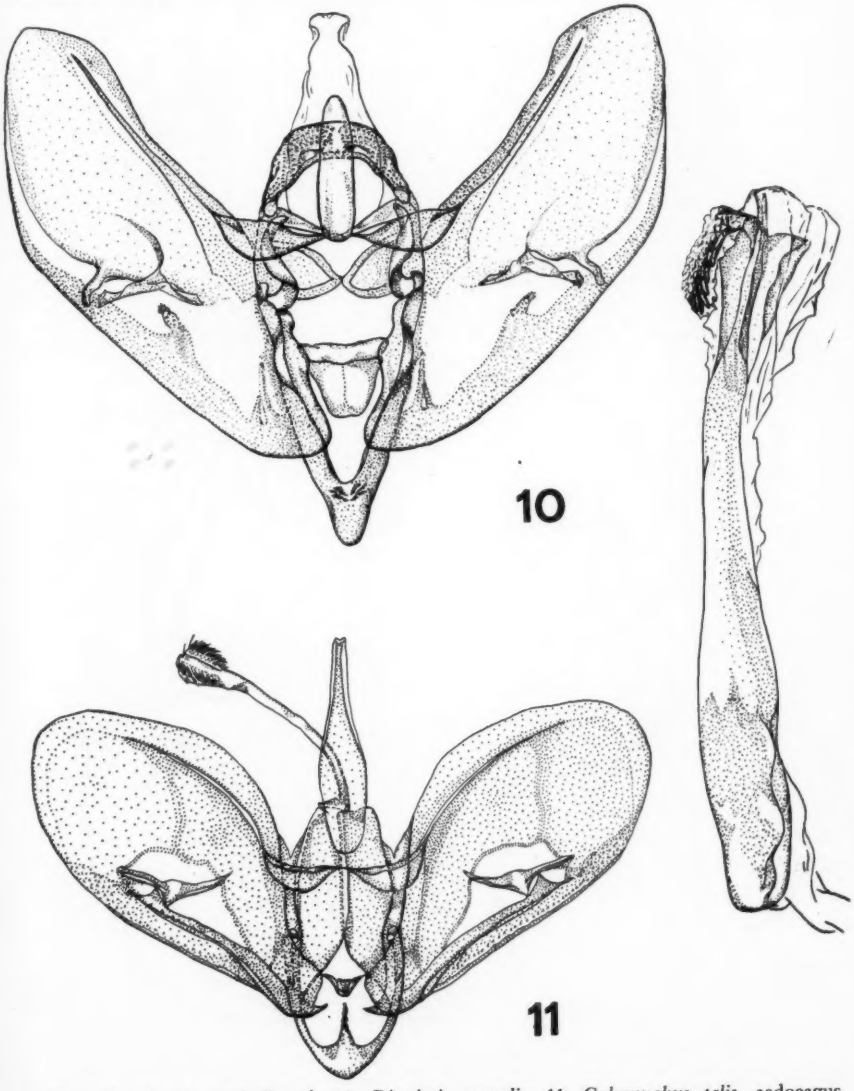
Rather similar in general aspect to *D. robustior*, but considerably smaller. Ground colour of fore wing usually orange yellow, but sometimes olivaceous brown, rarely fuscous; silvery spots usually very large; spot in basal part of cell usually fused with the large spot below base of cell, occasionally separated as a small, round spot; spot in distal part of cell always separate from, and usually nearly as large as, spot below end of cell; the latter square or oblong, with outer margin somewhat excised; submarginal spots quadrate, separate or fused, forming a curved row parallel to margin; subapical spot broad, oblique, occasionally connected with submarginal series by a stria along M_2. Expanse: 23-28 mm.

Male genitalia: spine of valve rather long, directed more ventrad then basad;

penis with two groups of cornuti, each composed of a row of from one to four weakly curved spines, the rows side by side, mostly closely approximated at the middle.

Female genitalia: Ductus with a trapezoidal sclerite a little anterior to ostium; behind this a constricted, unsclerotized zone; then a weakly inflated, sclerotized, scobinated zone, followed by a rather long scobinated tube leading into the small globular bursa; signum small and ovate.

Holotype, ♂, and allotype, ♀, Sayre, Okla., July 8, 1937, Standish-Kaiser; No. 6309, C.N.C.



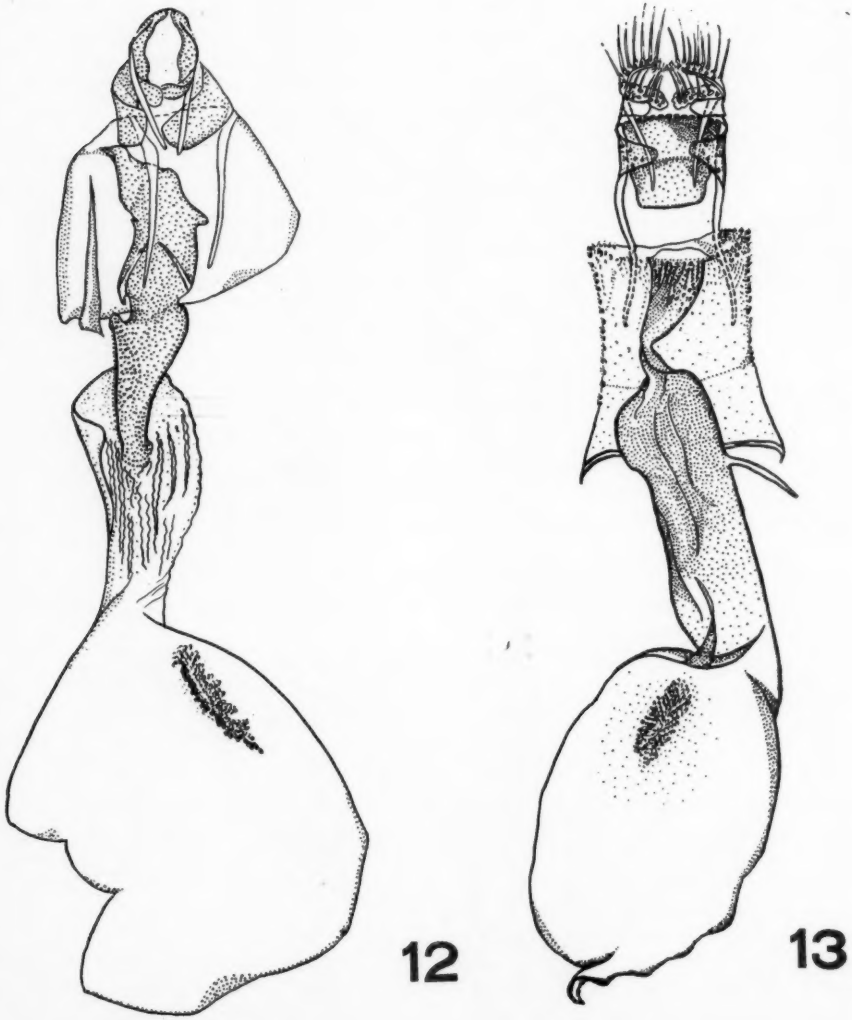
Figs. 10, 11. ♂ genitalia of: 10, *Diastictis caecalis*; 11, *Colomychus talis*, aedoeagus omitted.

Paratypes.—In the American Museum of Natural History, New York:—4 ♂ ♂, 1 ♀, from: Rancho La Sierra, Arlington, Riverside Co., Calif.; Ramsay Canyon, Huachuca Mts., Ariz.; Kits Peak Rincon, Baboquivari Mts., Ariz.; "Ariz."

In the Academy of Natural Sciences, Philadelphia:—1 ♀, Mouth of Rock Creek, Sta. Catalina Mts., Ariz.

In the British Museum (Natural History), London:—4 ♂ ♂, 5 ♀ ♀, from: Southern New Mexico, Poling; Prescott and Huachuca Mts., Ariz.; Oslar.

In the Canadian National Collection:—6 ♂ ♂, 2 ♀ ♀, from: Sayre, Okla.; Las



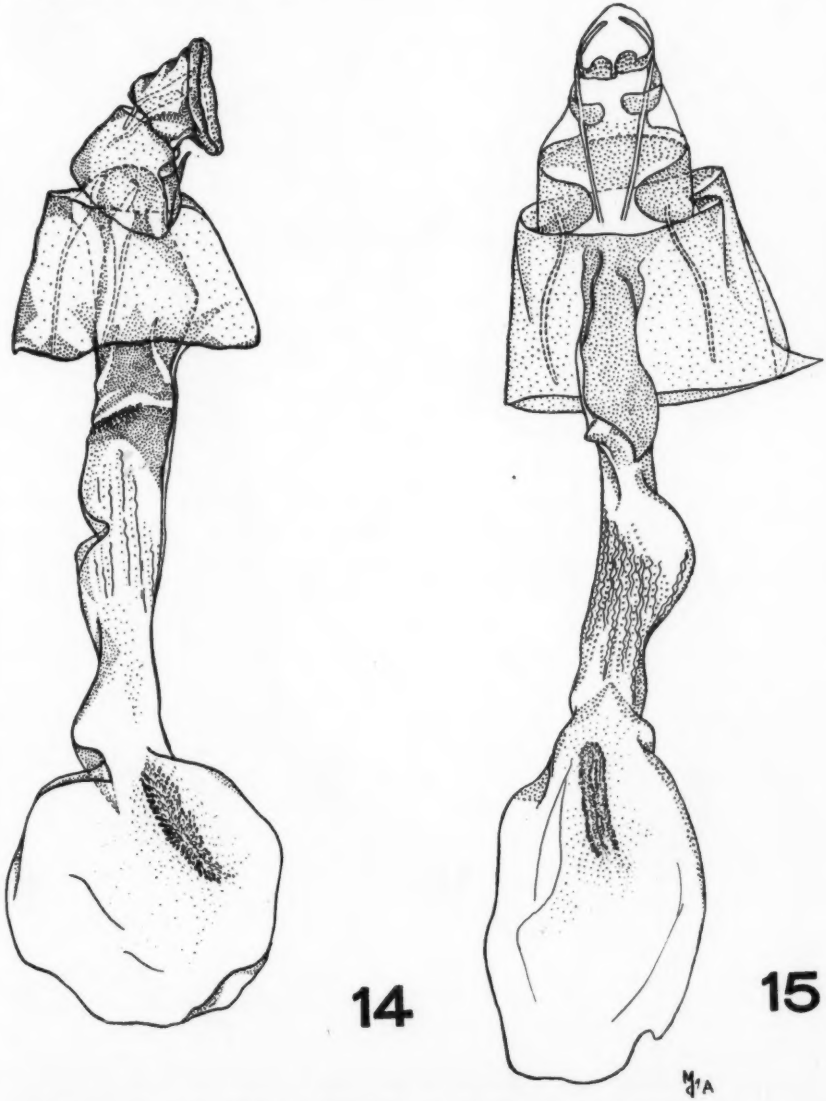
Figs. 12, 13. *Diastictis* spp., ♀ genitalia: 12, *D. argyralis*; 13, *D. pseudargyralis*.

Cruces and Silver City, N.M.; Baboquivari Mts. and Madera Canyon, Sta. Rita Mts., Ariz.

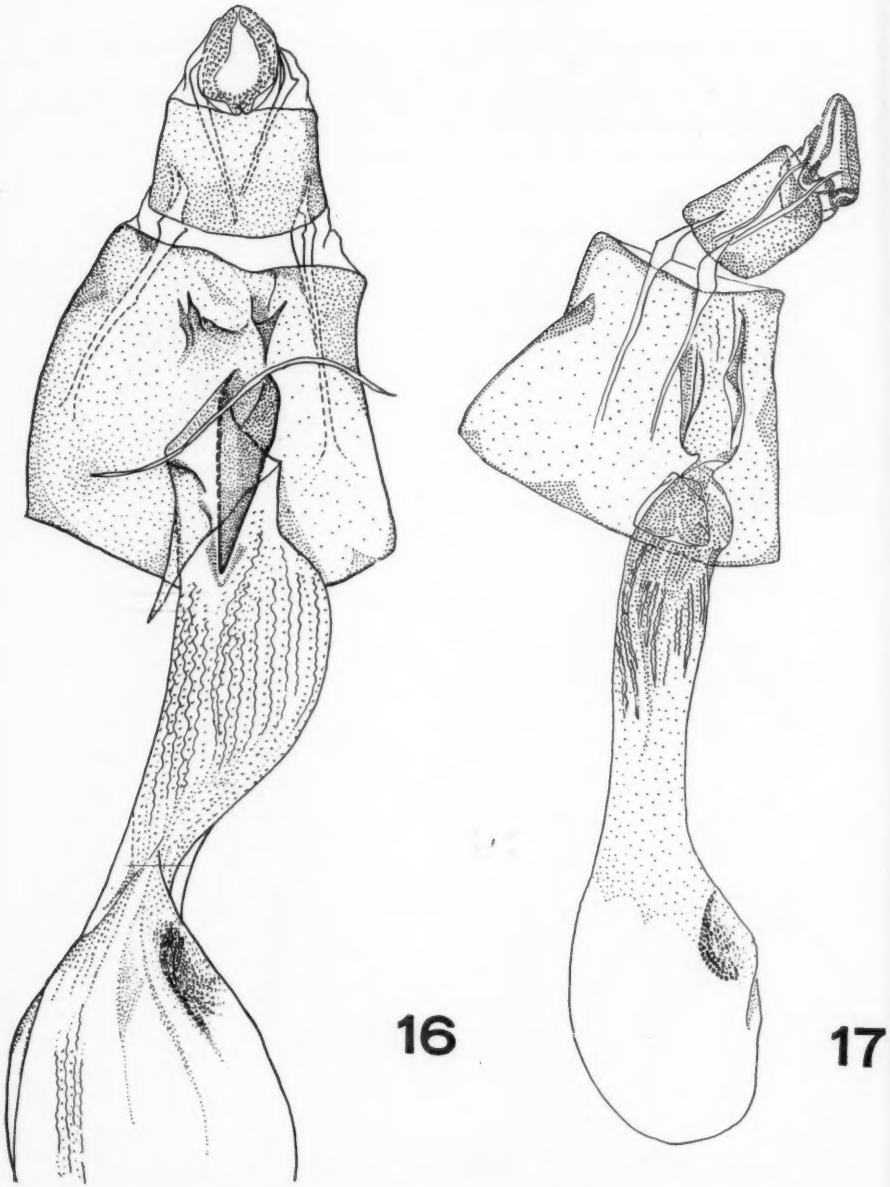
In the Carnegie Museum, Pittsburgh:—1 ♂, 1 ♀, from: Paradise and Douglas, Ariz.

In the Los Angeles County Museum:—3 ♂ ♂, 4 ♀ ♀, from: Baboquivari Mts., Madera Canyon, Sta. Rita Mts., and Globe, Ariz.

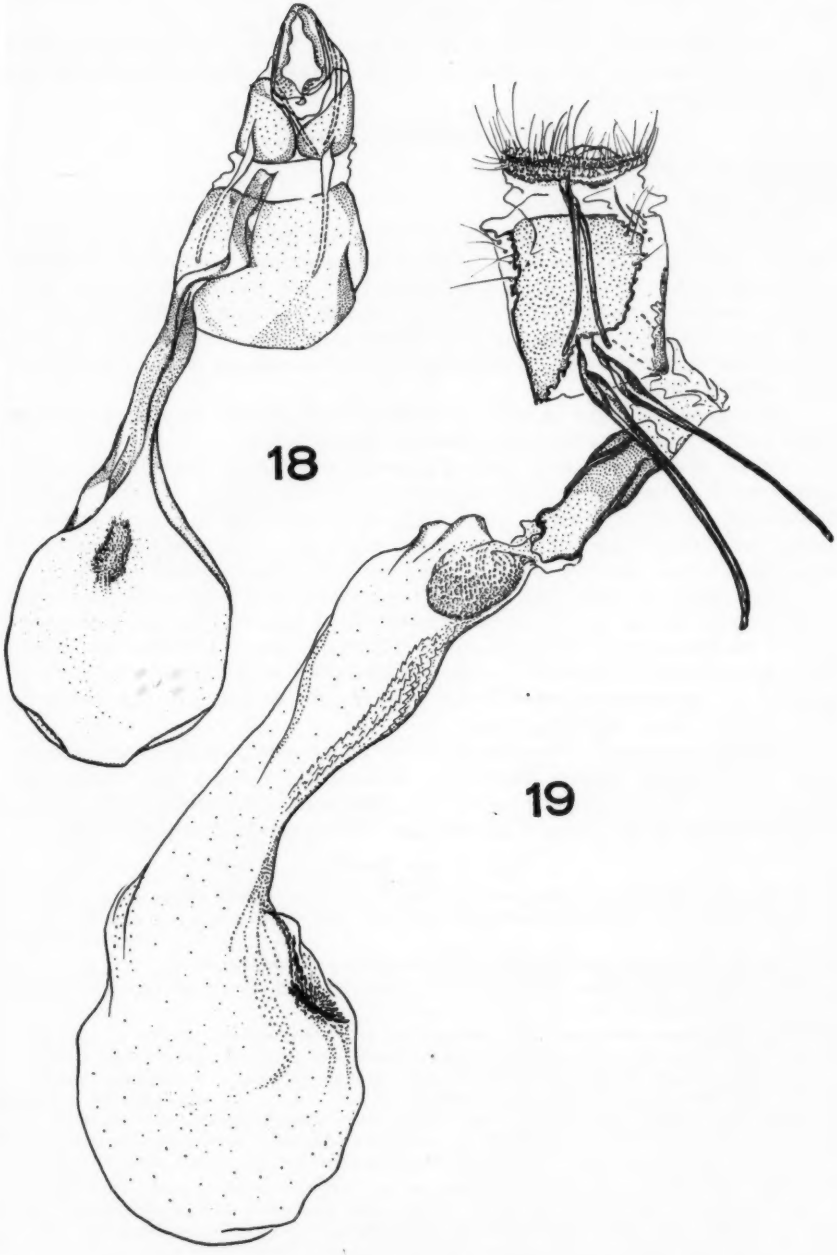
In the collection of R. J. Ford, Los Angeles:—3 ♂ ♂, 4 ♀ ♀, from Madera Canyon, Sta. Rita Mts., Ariz.



Figs. 14, 15. *Diastictis* spp., ♀ genitalia: 14, *D. ventralis*; 15, *D. fracturalis*.



Figs. 16, 17. *Diastictis* spp., ♀ genitalia: 16, *D. robustior*; 17, *D. sperryorum*.



Figs. 18, 19. *Diastictis* spp., ♀ genitalia: 18, *D. albovittalis*; 19, *D. caecalis*.

In the California Academy of Sciences, San Francisco:—4 ♂♂, 2 ♀♀, from: Todos Santos, Lower California; Chula Vista, Calif.; Tucson, Ariz.

I name this species in memory of the late John L. Sperry and Grace Herreshoff Sperry, lepidopterists, and benefactors of the Canadian National Collection and many other insect collections.

Diastictis caecalis (Warren)

Anomostictis caecalis Warren, 1892: 434.
Bocchoris caecalis, Hampson, 1898: 653.
Diastictis caecalis, Fernald, 1902: 375.

Fore wing walnut brown, overlaid with fuscous, hind wing clear walnut brown, with darker brown veins. Fore wing sometimes with traces of oblique antemedial line, always with a continuous black or fuscous postmedial band, sharply exserted between M_2 and Cu_2; the normal pale spots faintly indicated as paler brown patches on outer border of antemedial line, inner border of post-medial line, and in the cell. Hind wing with dark, sinuous postmedial line and dark terminal line.

Male genitalia: spine of valve directed ventrad; cornuti consisting of six or eight weakly curved spines arranged in a tight echelon.

Female genitalia: posterior part of ductus bursae narrow, heavily sclerotized; anterior to it and marked off by a slight constriction, a bulbous, slightly expanded, scobinated region, its ventral wall partly sclerotized; anterior part of ductus broad, scobinated, longitudinally folded, weakly sclerotized and denticulate on one side for some distance ahead of junction with medial expansion.

This species is easily distinguished from others in the genus by the bright wood-brown colour, by the complete post-medial lines of fore and hind wings, and by the brown, obsolescent, pale spots of the fore wing. The much commoner *Mecyna mustelinalis* (Packard) is often misidentified as *D. caecalis*, but is distinguished by having the pale postmedial areas distad, not basad, of the postmedial line, and by many other characters.

Material examined.—14 specimens, from the following localities in California: Hat Creek Ranger Station, Shasta Co.; Two Rock, Sonoma Co.; Spring Mt., Sonoma Co.; The Geysers, Sonoma Co.; Dunsmuir; Carzadero; Grass Valley; Idyllwild, San Jacinto Mts., Riverside Co.; Mint Canyon, Los Angeles Co.

Key to the Species

1. Fore wing without a complete postmedial line, and/or with several silvery spots or dots 2
   Fore wing with a complete postmedial line, palé spots light brown, not silvery ..... *caecalis* Warren
2. The three subapical spots discrete, all silvery spots small or minute 3
   The three subapical spots fused to form a continuous band, silvery spots usually large, never minute 5
3. Fore wing short and broad, outer margin weakly curved; cornuti of male comprising two groups of simple, thorn-like spines; female with posterior part of ductus bursae slender, sclerotized, and funnel-shaped, opening through a constriction into a heavily sclerotized expansion; southeastern U.S. ..... *pseudargyralis* Munroe
   Fore wing longer and narrower, outer margin more strongly curved; cornuti of male not in two groups of simple spines; female with posterior part of ductus bursae as wide as anterior part, or with expansion anterior to constriction unsclerotized 4
4. Male with one large spinulose cornutus and an irregular detached group of smaller, simple cornuti; ductus bursae of female with sclerotized, band-shaped, posterior portion, and sclerotized, funnel-shaped medial portion, opening eccentrically into a greatly expanded, membranous anterior portion; southeastern U.S. ..... *argyralis* Hübner
   Male with a single row of simple, curved cornuti; female with bursa of almost uniform width, posterior part and a small area of mesial part sclerotized; U.S. and southern Canada, east of the Rockies ..... *ventralis* Grote and Robinson

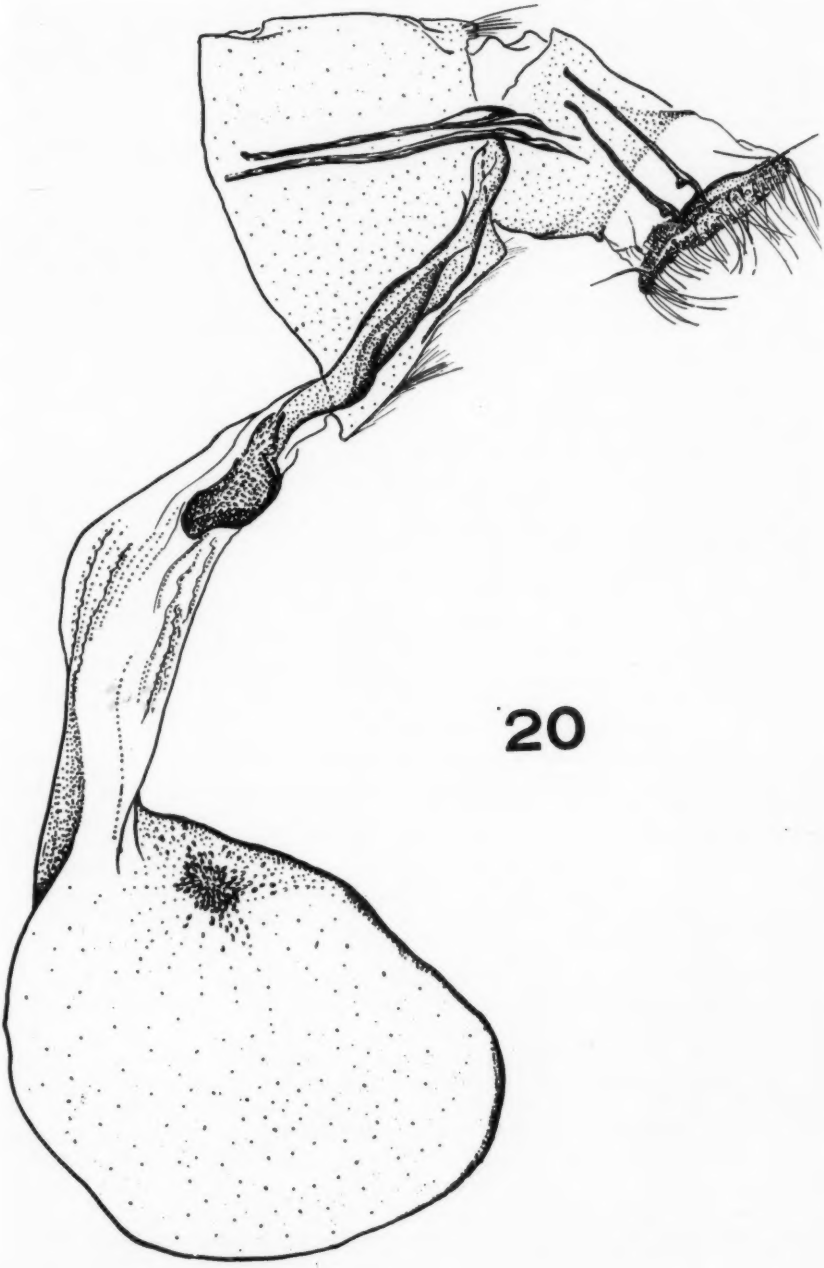


Fig. 20. *Diastictis holguinalis*, ♀ genitalia.

5. Spots of fore wing mat white, ground colour of fore wing fuscous, of hind wing infuscated; cornuti of male in two rows of curved spines, one row obliquely behind the other; female with medial portion of ductus bursae not inflated; Mexico *albovittalis* Munroe

Spots of fore wing silvery 6

6. Spot below end of cell with its anterior margin at least one and one-half times as long as its posterior margin, or the spot joined to the spot in the cell 7

Spot below end of cell with its anterior margin about as long as its posterior margin, never joined to the spot in the cell 9

7. Fore wing long and narrow, with distinctly greenish ground colour; spot below end of cell long and anvil-shaped, extending from base of Cu_2 nearly to submarginal row; cornuti of male in two oblique rows, the proximal one much smaller than the distal one ..... *viridescens* Munroe

Fore wing not noticeably long and narrow; ground colour rarely greenish; spot below end of cell not reaching nearly to base of Cu_2 or to submarginal band, either small or fused to spot in end of cell; cornuti of male in a single row 8

8. Expanse 18-21 mm.; male with cornuti a diminishing row of curved spines, the longest not very much longer than the others; female with a pronounced bulge in the sclerotized medial part of the ductus, on the opposite side to the rather small bulge in the membranous part; Cuba and southern Florida ..... *bolguinalis* Munroe

Expanse 23-30 mm.; male with cornuti in a diminishing row of curved spines, the longest much longer than the others; female without a pronounced bulge in the medial part of the ductus, but with a large bulge in the membranous part; Louisiana to California and Guatemala ..... *fracturalis* Zeller

9. Expanse 29-36 mm.; basal spot nearly parallel to inner margin; spot below end of cell about twice as long as broad; male with a single, large, twisted cornutus; ductus bursae of female with a long, slender triangular sclerite in medial portion and with posterior portion membranous ..... *robustior* Munroe

Expanse 23-28 mm.; basal spot of fore wing at a pronounced angle to inner margin; spot below end of cell about as long as wide; male with two rows of curved cornuti, the rows side by side, with concave surfaces outward; female ductus with a curved trapezoidal sclerite in posterior portion, medial portion sclerotized and expanded *sperryorum* Munroe

Appendix

The Nearctic species *Botis talis* Grote, placed in *Bocchoris* by Hampson and in *Diastictis* by Fernald and subsequent North American authors, is left without a genus by the present restriction of *Diastictis*. It is not closely related to *Diastictis*, but falls in the *Glyphodes* group, near *Trithyris* Lederer. As it differs from that genus in having the cell of the hind wing abnormally short, with M_2, M_3, and Cu_1 arising hardly beyond Cu_2, I propose *Colomychus*, new genus, type species *Colomychus talis* (Grote), new combination, = *Botis talis* Grote, 1878: 26. The male genitalia of *C. talis* are shown in Fig. 11.

Acknowledgments

I am very much indebted to the following gentlemen, who made material available to me, or who helped in other ways in the preparation of this paper: Dr. R. H. Beamer, University of Kansas, Lawrence; Mr. Harry K. Clench, Carnegie Museum, Pittsburgh; Mr. Robert J. Ford, South Gate, California; Dr. Walter Forster, Bavarian State Zoological Collection, Munich; Mr. Don Frechin, Bremerton, Washington; Dr. Maurice T. James, Colorado A. and M. College; Prof. Dr. E. M. Hering, Zoological Museum, Berlin; Mr. Hugh B. Leech, California Academy of Sciences, San Francisco; Mr. E. L. Martin, British Museum (Natural History), London; Mr. Lloyd M. Martin, Los Angeles County Museum; Dr. James A. G. Rehn, Academy of Natural Sciences, Philadelphia; Dr. F. H. Rindge, American Museum of Natural History, New York; The late Mr. John L. Sperry, Riverside, California.

The drawings of genitalia were made by Miss Marie d'Aoust, Insect Systematics and Biological Control Unit.

Figs. 21-44. *Diastictis* spp.: 21, 22, *D. argyralis*; 23-25, *D. pseudargyralis*, paratypes; 26-29, *D. ventralis ventralis*; 30-32, *D. ventralis seamansi*, paratypes; 33-35, *D. fracturalis*; 36, *D. holguinalis*, paratype; 37, *D. albovittalis*, paratype; 38, *D. viridescens*, holotype; 39, *D. robustior*, paratype; 40-42, *D. sperryorum*, paratypes; 43, 44, *D. caecalis*.

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Some Carabidae and Staphylinidae Shown to Feed on a Wireworm, *Agriotes sputator* (L.), by the Precipitin Test[1]

By C. J. S. Fox[2] and C. R. MacLellan[3]
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Many fields near the shore of St. Mary's Bay, Digby County, N.S., are severely infested with the wireworm *Agriotes sputator* (L.). This European species, established in Canada only in scattered areas in Nova Scotia, is a very prolific and destructive insect. Infested fields frequently contain one and a half million larvae per acre and as many as 55 larvae have been found in a six-inch cube of soil. In such areas the vegetation on many acres of potentially excellent grassland has deteriorated to little but hawkweeds, *Hieracium* spp., plants apparently not attractive to the larvae.

Carabidae and Staphylinidae are relatively numerous in the area; at least eight genera of the former and four genera of the latter are represented. According to Lindroth (1955), six species of the Carabidae are of European origin and these are marked with an asterisk in the following list:—

Carabidae: **Agonum mülleri* (Hbst.), **Amara aenea* (Deg.), **A. apricaria* (Payk.), **A. familiaris* (Dufts), *Blechrus* sp., **Clivina fossor* (L.), *Harpalus affinis* (Schrank), *Metabletus* sp., ? *americanus* (Dej.), **Notiophilus aquaticus* (L.), *Pterostichus* (*Poecilus*) spp.

Staphylinidae: *Philonthus* spp., *Staphylinus badipes* Lec., *Tachinus* sp., *Tachyporus* sp.

In the literature it is frequently assumed that carabids and staphylinids prey on wireworms but recorded observations of predation in the field are understandably rare since these insects live to a great extent under surface litter and

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underground. Forbes (1883) examined the gut contents of 175 carabids representing 20 genera and found no evidence of feeding on wireworms. Thomas (1940), in a review of literature on wireworms, lists records of only four species of carabids and one species of staphylinid feeding on elaterids in North America. The present study adds species in four genera of carabids and two genera of staphylinids to his list. Davies (1953) examined the crop contents of 366 British carabid beetles belonging to 84 species. His results suggested that the genera *Amara* and *Harpalus* were exclusively herbivorous in contrast to the present findings, which show these genera to be carnivorous to a substantial degree. Davies pointed out that much of their food probably consisted of juices or soft tissues not distinguishable microscopically.

Methods

To determine the percentages of larval and adult carabids and staphylinids that had fed on wireworms, the serological technique known as the precipitin test, described by West (1950), was used. The investigation was chiefly concerned with adults that in most instances were identified to genus, or species, although 88 adults and 133 larvae identifiable only to family were tested. Anti-*Agriotes sputator* serum was obtained from rabbits and tested against the suspected predators smeared on filter paper. The smears were made when the predators were collected or within 24 hours of collection. Predators were collected in 1954 and 1955 in all months except January, March, and November.

A few predators known to have fed on wireworms in the laboratory reacted positively and thus served as positive controls.

It was suspected that the wireworm *Athous affinis* Couper preyed on *Agriotes sputator* as they were found together in Digby County, although it would probably not be an important predator as it formed less than one per cent of the wireworm population. To ascertain whether this was so, it was necessary to determine whether the anti-serum was specific within the Elateridae. Therefore, larval smears of *Athous affinis*, *Ctenicera* sp., *Hemicrepidius memmonius* (Hrbst.), and *Melanotus* sp., representing two sub-families, were tested against anti-*A. sputator* serum and reacted positively. Hence the technique, as employed, was not useful for indicating predation by *A. affinis* or for distinguishing between species of wireworms preyed upon. Refinement of the anti-serum by absorption or other means might make it so.

The authors are indebted to Messrs. W. J. Brown, E. C. Becker, and R. de Ruette, Insect Systematics and Biological Control Unit, Entomology Division, Ottawa, for identifying sample specimens of the beetles sent to them before and during this investigation.

Results and Discussion

Table I summarizes the results of testing smears of suspected predators against anti-*Agriotes sputator* serum. Some of the apparent predation may in fact have been scavenging; also, some of the predators may have fed on predators that had fed on wireworms. The technique does not distinguish between such modes of feeding.

Of the Carabidae, *Amara* spp. may be the most important predators because of their great abundance; *A. familiaris* is the most numerous species. *Harpalus* spp., chiefly *H. affinis*, are fairly numerous and over half of the specimens tested reacted positively. The small species *Clivina fossor* is rare in the fields from which collections were taken in Digby County and all smeared specimens were from Hall's Harbour, Kings County, where they may have fed on *Agriotes mancus* (Say), *Dalopius pallidus* Brown, or *Hypolithus abbreviatus* (Say), elaterid

TABLE I

Results of testing predator smears against anti-*A. sputator* serum (titre 1:2500), 1954–5

Suspected predator	Number tested	Per cent shown to have fed on wireworms	Suspected predator	Number tested	Per cent shown to have fed on wireworms
Carabidae			*Staphylinidae*		
Agonum mülleri (Hbst)	5	20.0	*Philonthus* spp.	18	27.7
Amara spp.	288	29.8	*Staphylinus* sp.	24	25.0
Clivina fossor (L.)	40	35.0	*Tachyporus* sp.	83	13.2
Harpalus spp.	50	54.0	Adults unidentified	46	36.9
Pterostichus spp.	20	20.0	Larvae "	27	29.6
Adults unidentified	22	36.3			
Larvae "	106	33.9			

species numerous in the area. As its name indicates it is well equipped to dig and tunnel for food and it may be an important predator. *Agonum mülleri* and *Pterostichus* spp. apparently fed on wireworms but the meagre data give little information on their possible value. A substantial number of unidentified larvae and adults had fed on wireworms. *Blechrus* sp., *Metabletus* sp., ? *americanus*, and *Notiophilus aquaticus* were not collected in sufficient numbers to test.

Staphylinid beetles examined, of the genera *Philonthus*, *Staphylinus*, and *Tachyporus*, preyed to some extent. *Tachyporus* sp., a small beetle about 3 mm. long, was least frequently positive but it may be an important predator as it is relatively abundant. A fairly high percentage of unidentified larvae and adults had fed on wireworms. Smears of *Tachinus* sp. were not obtained.

The records showed, as might be expected, that predation declined in the colder months and apparently did not occur in February, the coldest month in which smears of predators were obtained.

Interesting as it is to have evidence that these beetles and their larvae are predators of wireworms, they appear to be incapable of preventing prolonged and severe infestations of *A. sputator*. Some of these persisted, according to one local farmer, for 60 years. Possibly the samples were taken at a point in a rather lengthy development of the wireworm population when the optimum population of predators had not been reached. It is also possible that some of the most effective predators found in Europe were not introduced with the wireworm. For example, it is perhaps significant that no European staphylinids have been reported from the area and that *Clivina fossor* L. is scarce. A sort of balance has apparently been reached in parts of Nova Scotia infested by native wireworms only and the grasslands appear luxuriant. At present, in the Digby area, the main factor limiting the wireworm population appears to be grass; when the grass is destroyed by larvae and replaced by hawkweeds the wireworm population declines, as has been indicated by surveys of the population and vegetation in the area.

Summary

In Nova Scotia use of the precipitin test indicated that certain species of the carabid genera *Agonum*, *Amara*, *Clivina*, *Harpalus*, and *Pterostichus* (*Poecilus*) and of the staphylinid genera *Philonthus*, *Staphylinus*, and *Tachyporus* preyed on elaterid wireworms in the field. Carabid and staphylinid larvae and adults collected in all months except January, March, and November from fields infested with wireworms were smeared on filter paper and tested against anti-*Agriotes sputator* (L.) serum.

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New Species of Bark Beetles (Coleoptera: Scolytidae), Mostly Mexican. Part II[1]

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In this paper 12 new species of scolytid beetles of the tribe Micracini are described from the United States, Mexico and Honduras. Notes concerning the geographical distributions and the biologies of a few other Mexican species are also included. Unless stated otherwise, the specimens taken in Mexico were collected by the author while with the 1953 expedition of the Francis Huntington Snow Entomological Museum (University of Kansas, Lawrence). The new species represent the following genera: *Micracisella* (3), *Thysanoes* (2), *Pseudothysanoes* (3), *Crytocleptes* (3), and *Stenoclyptus* (1).

Micracisella knulli (Blackman)

This species, previously unrecorded from Mexico, was collected 11 miles northeast of Jacala, Hidalgo, on June 23, 1953, from a broken oak branch. In addition to Blackman's type series, one other specimen from Arizona was examined; it was taken in the Santa Rita Mountains, by Hubbard and Schwarz.

The general habitus, the sculpture and vestiture of the frons, and the antennae indicate that this species should be in the genus *Micracisella* Blackman, not in *Micracis* Leconte where it was originally described.

Micracisella striata, new species

This species evidently is more closely allied to *nigra* than to the other known species of the genus. It is distinguished from other species by the following combination of characters: female frons convex; elytra rather coarsely striate; and the declivital scales recumbent.

Female.—Length 1.6 mm. (paratypes 1.3-1.6 mm.), 3.1 times as long as wide; body colour brown.

Frons convex; smooth, shining, and glabrous on a subtriangular area between epistomal margin and upper level of eyes, becoming coarsely reticulate at sides and above; vestiture short, coarse, rather sparse, longer and fine along epistoma. Eyes rather coarsely granulate; shallowly emarginate; rather widely separated below. Antennal scape club-shaped; club 1.3 times as long as wide, the first suture extending slightly less than half the length of the club.

Pronotum 1.1 times as long as wide; sides straight and subparallel on basal half; rather broadly rounded in front and armed by two small slender teeth; posterior half coarsely reticulate, with a few scattered granules; vestiture consisting of slender scales and sparse hair.

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Elytra twice as long as wide; sides straight and subparallel on basal three-fourths, rather broadly, obtusely acuminate behind, minutely divaricate at apex of suture; straie not impressed, the punctures rather large, close, deep; interstriae narrower than straie, the punctures rather large, deep, subgranulate. Declivity rather steep, convex; sculpture similar to disc, but indistinctly coarser. Vestiture consisting of minute strial hair, and recumbent interstrial scales, each scale two and one-half times as long as wide; an additional row of small sutural scales on declivity; vestiture usually entire on disc as well as on declivity.

Male.—Similar to female except: frons more flattened and reticulate below, more pubescent above; marginal teeth on pronotum larger; and scales of declivity evidently stouter.

Type Locality.—Olanchito, Honduras

Host.—Unknown.

Type Material.—The female holotype, male allotype, and four paratypes were collected at the type locality on July 30, 1949; ten other paratypes were taken at the same locality May 19, June 22, and Sept. 8, 1949, three other paratypes were taken at La Ceiba, Honduras, on May 18, and June 17 and 28 , 1949; all were collected at light by E. C. Becker. The holotype, allotype, and some paratypes are in the Canadian National Collection; other paratypes are in the collections of the U.S. National Museum.

Micracisella nigra, new species

This species evidently is more closely allied to *striata* than to other known species. It is distinguished from other representatives of the genus by the following combination of characters: body colour black; the female frons convex; the frontal vestiture and strial punctures reduced, almost obsolete.

Female.—Length 1.6 mm. (paratypes 1.4-1.6 mm.), 3.1 times as long as wide; body colour entirely black.

Frons convex, epistomal area transversely flattened; surface smooth; vestiture fine, very short, sparse. Eyes enlarged, very coarsely granulate, narrowly emarginate; rather widely separated below. Antennal scape stout, club-shaped, ornamented by a tuft of long yellow hair; club 1.1 times as long as wide, the first suture not reaching the middle.

Pronotum 1.1 times as long as wide; sides weakly arcuate on basal half; rather broadly rounded in front and armed by two rather slender teeth; posterior half rather coarsely reticulate; almost glabrous.

Elytra about 1.9 times as long as wide; sides straight and subparallel on basal three-fourths; posterior acumination broad, short, minutely divaricate at apex of suture; striae not impressed, the punctures almost obsolete except obscure on striae one and two; interstriae minutely subcrenulate, punctures obsolete. Declivity rather steep; strial punctures feebly indicated, interstriae uniseriately granulate. Vestiture largely limited to declivity; consisting of rather short semierect scales, each scale about three times as long as wide.

Male.—Similar to female except: antennal scape more slender, the pubescence reduced; and the declivital scales stouter.

Type Locality.—La Ceiba, Honduras.

Host.—Unknown.

Type Material.—The female holotype, male allotype, and nine paratypes were collected at the type locality on May 15, and 29 (type), and June 7, 10, and 17, 1949; one other paratype was collected at Olanchito, Honduras, Sept. 8, 1949; all were taken at light by E. C. Becker. The holotype, allotype, and some

paratypes are in the Canadian National Collection; other paratypes are in the collections of the U.S. National Museum.

***Micracisella hondurensis*, new species**

This species is very closely allied to *nanula* (Leconte) and *opacithorax* (Schedl). It is distinguished from *nanula* by the following combination of characters: the declivital punctures of interstriae not granulate, uniseriate; and the declivital scales larger. From *opacithorax* it is distinguished by the narrower declivital scales; and the punctures of the discal and declivital interstriae much smaller and not as deep as those of the striae.

Female.—Length 2.0 mm. (paratypes 1.6-2.1 mm.), 3.2 times as long as wide; elytra brown in colour, pronotum very dark brown, almost black.

Frons convex above, transversely impressed above epistoma, a median carina feebly indicated on lower half; surface opaque except on a small shining median episomal area; vestiture limited to epistomal and lateral areas, longer along epistoma and near median margin of eyes above. Antennal scape club-shaped, ornamented by a tuft of long hair; club about 1.3 times as long as wide, the first suture reaching the middle.

Pronotum 1.2 times as long as wide; sides almost straight and subparallel on basal half; rather broadly rounded in front; posterior half coarsely reticulate, with sparse, very fine subgranulate punctures; vestiture consisting of sparse inconspicuous minute hair and a few short slender scales.

Elytra twice as long as wide; sides straight and subparallel on basal three-fourths; acuminate behind; striae not impressed, the punctures small, distinct, shallow; interstriae wider than striae, flat, the punctures fine, shallow, inconspicuous, not granulate. Declivity rather steep, convex, reticulate; strial punctures rather obscure; interstrial punctures uniseriate, smaller and deeper than those of striae, finely subgranulate laterally. Vestiture consisting of fine, short recumbent strial hair and longer erect scales, each scale at least four times as long as wide.

Male.—Similar to female except: frons more convex, the transverse impression and vestiture reduced; pubescence of antnnal scape shorter, less abundant; and scales of declivity wider, about three and one-half times as long as wide.

Type Locality.—Olanchito, Honduras.

Host.—Unknown.

Type Material.—The female holotype, male allotype, and two paratypes were collected at the type locality on July 30, 1949; 17 other paratypes were taken at the same locality on May 19, July 7, and Sept. 8, 1949; all were collected at light by E. C. Becker. The holotype, allotype, and some paratypes are in the Canadian National Collection; other paratypes are in the U.S. National Museum.

***Micracisella opacithorax* (Schedl)**

This species was rather common in the lower Rio Grande Valley (Cameron County) in Texas, and at several localities along the highway between Matamoros and Cindad Mante, Tamaulipas, Mexico. The hosts were Mimosa and Mesquite.

***Thysanoes* Leconte**

Of the five species of *Thysanoes* collected in Mexico, four of them could not be separated from species occurring in the United States. The mexican records given below were all obtained in 1953 by the author.

Thysanoes fimbricornis Leconte. Thirty miles southwest of El Salto, Durango, July 23, from *Quercus* sp.; 28 miles south of Jacala, Hidalgo, June 22, from an unknown shrub; five miles west of Antiguo Morelos, Tamaulipas, June 20, from an unknown desert tree; and 22 miles southwest of Jalapa, Vera Cruz, June 29, from an unknown shrub.

Thysanoes lobdelli Blackman. Totolapan, Oaxaca, July 7, from the seedling of an unknown tree.

Thysanoes texanus Blackman. Jimenez and Llera, Tamaulipas, June 15, from Mimosa; and three miles east of Orizaba, Vera Cruz, July 1, from an unknown desert tree.

***Thysanoes mexicanus*, new species**

This species is very closely allied to *berchemiae* Blackman, but is distinguished by the following characters: the broad frontal impression not as deep or extensive, with the small median sulcus deeper and wide; and the declivital scales much wider (especially in the male).

Female.—Length 1.8 mm. (paratypes 1.6-1.9 mm.), 2.9 times as long as wide; body colour dark brown.

Frons strongly, subconcavely, transversely impressed above epistomal area, flattened or feebly convex above this impression, epistoma raised and shining; a short, rather deep, subfoveate median sulcus ending dorsally about three-fourths of the distance from epistomal margin to upper level of eyes; surface finely granulate-punctate above, reticulate in upper part of transverse impression, smooth below; vestiture very sparse, short, largely confined to lateral areas. Antennal scape long, club-shaped, ornamented by a few rather long setae; club 1.4 times as long as wide, similar to allied species.

Pronotum as long as wide; sides arcuate, distinctly constricted anteriorly; rather broadly rounded in front; posterior half rather coarsely reticulate, with a few fine punctures; vestiture consisting of short hair and very slender scalelike setae.

Elytra 1.8 times as long as wide, 1.9 times as long as pronotum; sides straight and subparallel on basal two thirds, rather narrowly rounded behind; striae not impressed, the punctures very small and separated by more than their own diameters; interstriae wider than striae, the punctures uniseriate, finely granulate, rather widely spaced. Declivity rather steep, convex; sculpture about as on disc. Vestiture consisting of minute strial hair and uniseriate rows of longer erect interstrial scales, each scale about five times as long as wide.

Male.—Similar to female except: the transverse frontal impression not as deep, more strongly convex above; antennal scape with fewer hairs; anterior margin of pronotum armed by six small teeth; and scales of declivity stouter, about two and one-half times as long as wide.

Type Locality.—Twenty-five miles southeast of Oaxaca, Oaxaca, Mexico.

Host.—Unknown.

Type Material.—The female holotype, male allotype, and 31 paratypes were collected at the type locality on July 6, 1953 from an unknown hillside shrub. The galleries were in the wood and appeared similar to those of other species of the genus. The holotype, allotype, and some paratypes are in the Snow Entomological Collections; other paratypes are in the Canadian National Collection and the collections of the U.S. National Museum.

***Thysanoes pallens*, new species**

This species is very similar to *texanus* Blackman, but differs by the much less strongly impressed frons, by the deeper frontal sulcus, by the shallower strial punctures, by the non-granulate interstriae, and in the male by the shorter declivital scales. Because of the pale colour it probably has been confused with *fimbricornis* Leconte, although the two species are not closely allied.

Female.—Length 1.6 mm. (paratypes 1.2-1.6 mm.), 2.9 times as long as wide; body colour yellowish-brown.

Frons with a rather deep, short, transverse impression (not concave); convex above the impression; epistoma raised, shining; the median sulcus short, deep, rather wide (subfoveate), located at middle of frontal area; surface smooth on epistoma, reticulate in impression, finely granulate above; vestiture fine, short, sparse, hairlike. Antennal scape rather long, club-shaped, with a few long hairs; club as in *texanus*.

Pronotum 1.05 times as long as wide; sides weakly arcuate, rather broadly rounded in front; posterior half shining, almost smooth, with a few fine punctures; vestiture consisting of scattered short bristles.

Elytra 1.9 times as long as wide, about 1.9 times as long as pronotum; sides straight and subparallel on basal two-thirds, rather narrowly rounded behind; striae not impressed, narrow, the punctures small, distinct, very shallow; interstriae wider than striae, the punctures fine and sometimes appearing subgranulate. Vestiture consisting of minute strial hair; and longer erect uniseriate interstrial scales, each scale about five or six times as long as wide.

Male.—Similar to female except: length 1.3 mm., 2.7 times as long as wide; frons more nearly flattened below, the transverse impression rather weak; anterior margin of pronotum armed by four small widely spaced teeth; interstrial punctures of disc minutely granulate; and declivital scales wider and about three times as long as wide.

Type Locality.—Sanford, Florida.

Hosts.—*Quercus* sp. (type), *Carya* spp., and *Rhizophora mangle*.

Type Material.—The female holotype, male allotype, and two paratypes were collected at the type locality on July 11, 1951 from the wood of oak branches. Thirty-one other paratypes were taken as follows: Madisonville, Louisianna, June 6, 1951; Delray Beach and Oleno State Park, Florida, June 1951; and Pujal, San Luis Potosi, Mexico, June 20, 1953; all were collected by the author. One other paratype was taken at Nicholson, Mississippi, Jan. 19, 1954, by an unknown collector. The holotype, allotype, and some paratypes are in the Snow Entomological Collections; other paratypes are in the Canadian National Collection and the collections of the U.S. National Museum.

***Pseudothysanoes quercicolens*, new species**

This species is very closely allied to *barberi* Blackman, *gambetti* Blackman, and *sedulus* Blackman. It differs by the absence of scalelike setae on the posterior half of the pronotum; on paratypes of Blackman's three species the vestiture on the pronotum consists of about equal numbers of hairlike and rather broad scalelike setae. It is possible that when adequate material is available Blackman's species will be grouped under one name and *quercicolens* will be reduced to subspecific rank.

Male.—Length 1.6 mm. (paratypes 1.5-1.7 mm.), 2.7 times as long as wide; body colour black.

Frons flattened, with the epistomal area gradually raised toward the margin; surface reticulate, becoming smooth toward margin; vestiture of moderate length and density, longer at sides near epistoma. Eye rather short, oval; finely granulate. Antennal scape short and broad, slightly longer and about twice as wide as pedicle; club as in allied species.

Pronotum about 0.9 times as long as wide; subcircular in outline; the anterior margin irregularly armed by about six to eight teeth; posterior areas finely reticulate and rather finely, sparsely punctured; vestiture consisting of a few scales intermixed with sparse hair in the anterior asperate area, and rather coarse hairlike setae on the posterior half.

Elytra with sides straight and subparallel on basal two-thirds, rather narrowly rounded behind; striae not impressed, the punctures rather small, deep; interstriae slightly narrower than striae, each uniseriately granulate, the granules rather large, rounded, slightly larger toward declivity, squamiferous. Declivity rather steep; striae slightly impressed, the punctures reduced, obscure; interspaces three and nine slightly elevated; the granules on three confused. Vestiture consisting of fine strial hair; and longer erect, interstrial scales, each scale about two to two and one-half times as long as wide.

Female.—Similar to male except: frons more finely sculptured; antennal scape larger, about twice as long and more than three times as wide as the pedicle, marginally ornamented by rather long hair; serrations on anterior margin of pronotum slightly smaller; and elytra evidently more finely sculptured.

Type Locality.—Thirty miles southwest of El Salto, Durango, Mexico.

Host.—Quercus sp.

Type Material.—The male holotype and 14 paratypes were taken at the type locality on July 23; the female allotype and 13 paratypes were collected 20 miles northeast of Copal, Sinaloa, Mexico, on July 22; and three paratypes were taken 11 miles northeast of Jacala, Hidalgo, Mexico, on June 22; all were collected from the bark of twigs of a narrow-leaved Oak during 1953. The holotype, allotype, and some paratypes are in the Snow Entomological Collections; other paratypes are in the Canadian National Collection and in the collections of the U.S. National Museum.

***Pseudothysanoes costatus*, new species**

This species is allied to *heliura*, but the elevated ridge on the elytral declivity of the male extends only from the elytral apex laterally along the ninth interspace to the declivital base; it is also distinguished by the smaller size, the finer sculpture, and the shorter, less abundant vestiture.

Male.—Length 1.2 mm., 2.8 times as long as wide; body colour dark brown.

Frons medially impressed and foveate at center, convex above; epistomal area weakly, gradually raised; surface rugose above, becoming smooth toward epistoma; vestiture rather abundant and directed dorsally above, sparse below; the setae subplumose, rather long. Eye oval, entire; finely granulate. Antennal scape rather long, club-shaped; club with first segment short, the sutures weakly arcuate.

Pronotum subcircular in outline; anterior margin armed by four teeth, the median pair larger and subcontiguous; summit anterior to middle; posterior half smooth, shining, the punctures sparse, minute, obscure; vestiture consisting largely of erect scales, longer and subplumose in asperate area.

Elytra about 1.7 times as long as wide; sides straight and subparallel on basal two-thirds; rather narrowly rounded behind; striae not impressed, the punctures rather large, deep, close; interstriae about half as wide as striae, the punctures fine, subgranulate, squamiferous. Declivity rather steep, not strongly convex; striae not as deep and slightly smaller than on disc; interstriae smooth and glabrous except one and nine; nine rather strongly, narrowly elevated from just behind declivital base to elytral apex. Vestiture consitting of inconspicuous strial hair; and slightly longer erect scales, each scale about twice as long as wide; scales absent on declivity except on interspaces one and nine, smaller and more abundant on nine.

Female.—Similar to male except: length 1.3 mm., 3.0 times as long as wide; antennal scape with a few long hairs, club more elongate; pronotum more elongate, the anterior margin unarmed; strial punctures not as coarse; elytral de-

clivity more strongly convex, the striae not clearly indicated, ninth interspaces not elevated, and all interspaces squamose as on disc.

Type Locality.—Madero Canyon, Santa Rita Mountains, Arizona.

Host.—*Quercus* sp.

Type Material.—The male holotype, female allotype, and six paratypes were collected on July 10, 1952, from small oak branches by W. E. LaBerge. The holotype and allotype are in the Snow Entomological Collections; the paratypes are in the Canadian National Collection and the collections of the U.S. National Museum.

***Pseudothyanoes heliura*, new species**

This species is more closely allied to *costatus* than to other known species. Sexual dimorphism in the sculpture of the elytral declivity is unique in the genus and suggests that found in certain species of *Hylocurus*, *Micracis* and *Phloeocleptus*.

Male.—Length 1.3 mm. (paratypes 1.2-1.4 mm.), 2.5 times as long as wide; body colour very dark brown.

Frons moderately, transversely impressed above epistoma, subfoveate at center, weakly convex above; surface rugose above, smooth and shining below; vestiture consisting of sparse, rather short, coarse hair. Eye oval, entire; finely granulate. Antennal scape short, club-shaped; club with first segment short, the sutures not strongly or narrowly arcuate.

Pronotum 0.83 times as long as wide; sides arcuate, moderately constricted in front of middle; broadly rounded in front and armed by four very fine teeth; summit in front of middle; posterior and lateral areas almost smooth, with a few fine punctures; vestiture short, slightly longer in asperate area, consisting of rather sparse erect scales and equally abundant hair.

Elytra 1.6 times as long as wide; sides subparallel on basal three-fourths, rather broadly rounded behind, declivity obliquely truncate; striae not impressed, the punctures small, deep, close; interstriae wider than striae, each with a row of fine, sparse granules. Declivity weakly convex; sharply margined on almost a perfect circle by a moderately elevated circumdeclivital costal ring; declivital face with punctures confused, rather close, equal in size to strial punctures of disc. Vestiture on the circumdeclivital costa consisting of close, erect, rather wide, white scales; scales on disc and face of declivity shorter, narrower, rather sparse.

Female.—Similar to male except: length 1.7 mm., 2.8 times as long as wide; elytra 1.8 times as long as wide; declivity convex, rather steep, with no indication of a circumdeclivital costa, the strial punctures in rows, the interstrial punctures almost as large as those of striae; elytral scales more abundant, longer near declivital margin.

Type Locality.—Luling Texas.

Host.—*Condalia obtusifolia*.

Type Material.—The male holotype, female allotype, and 22 paratypes were collected at the type locality on March 30, 1951, from branches about one inch in diameter, by the author. The galleries were constructed in the wood, and were similar to those of certain species of *Thysanoes*. Specimens remained active in the original branch (kept in a jar) for 23 months after they were originally collected. During this time there was a slight increase in the number of specimens. The holotype, allotype, and some paratypes are in the Snow Entomological Collection; other paratypes are in the Canadian National Collection and the collections of the U.S. National Museum.

***Cryptocleptes subpilosus*, new species**

This species is more closely allied to *acaciae* Blackman than to other known species. It differs by the deeper, subpilose frontal concavity of the female; and the deeper, larger, subquadrate strial punctures of the male.

Female.—Length 1.1 mm., 2.7 times as long as wide; pronotum brown, elytra brownish-black.

Frons broadly concave from epistomal margin to well above upper margin of eyes; finely punctured on upper half, smooth below; pubescence very short, close, subpilose on a subcircular area on upper half of the concavity. Eye short, oval; finely granulate. Antennal scape, funicle and club subequal in length.

Pronotum 0.94 times as long as wide; sides almost straight and subparallel on basal half, feebly constricted in front of middle; broadly rounded in front, unarmed; summit slightly in front of middle, rather high; posterior half shining, coarsely reticulate; punctures not evident; subglabrous behind; vestiture short, sparse, scalelike in front.

Elytra 1.8 times as long as wide; sides straight and subparallel on basal two-thirds; rather narrowly rounded behind; surface shining, almost smooth; striae and strial punctures greatly reduced, obscure; striae indicated by rows of minute strial hair, the interspaces by rows of longer erect scales, each scale about three times as long as wide. Declivity steep, convex; interstrial scales shorter, stouter.

Male.—Similar to female except: length 1.0 mm., 2.3 times as long as wide; frons transversely flattened on lower half, convex above, finely granulate; anterior margin of pronotum armed by seven (normally eight) teeth; strial punctures obscure at base, increasing rapidly in size and depth posteriorly, large, deep, subrectangular on posterior third of disc; interstriae narrower than striae; uniseriately granulate; declivity gradual, the strial punctures reduced in size and depth toward apex, interspaces as on disc; and interstrial scales stouter, one and one-half times as long as wide.

Type Locality.—Twenty miles east of Tehuantepec, Oaxaca, Mexico.

Host.—Unknown.

Type Material.—The female holotype, male allotype, and eight paratypes were collected at the type locality on July 8, 1953, from the bark of twigs of a small malvaceous tree. The holotype and allotype are in the Snow Entomological Collections; the paratypes are in the Canadian National Collection and the collections of the U.S. National Museum.

***Cryptocleptes minulus*, new species**

This species evidently is more closely allied to *dislocatus* Blackman than to other known species. It differs from all previously known species by the convex frons of the female.

Female.—Length 1.05 mm., (paratypes 0.9-1.1 mm.), 2.7 times as long as wide; body colour black.

Frons weakly convex, with a subfoveate impression between eyes; surface coarsely reticulate. Eye short, oval; finely granulate. Antennal scape and funicle subequal in length, rather short, the club slightly longer.

Pronotum indistinctly wider than long; sides feebly arcuate on posterior half, weakly constricted anterior to middle; rather narrowly rounded in front; posterior half shining, indistinctly reticulate and finely, sparsely punctured; vestiture consisting of a few short flattened bristles in front, subglabrous behind.

Elytra with sides straight and subparallel on basal two-thirds; rather narrowly rounded behind; striae not impressed, the punctures very fine and shallow;

interstriae wider than striae, shining, minutely rugulose, the punctures minute, obscure. Declivity steep, convex; interstriae with puncture finely subgranulate. Vestiture consisting of minute strial hair and longer flattened interstrial bristles; pubescence usually abraided except on declivity.

Male.—Similar to female except: body slightly smaller and stouter; strial punctures obscure, evidently larger; interstriae each with a row of very fine granules; and the elytral bristles scalelike, about four times as long as wide.

Type Locality.—Six miles west of Zanatepec, Oaxaca, Mexico.

Host.—Unknown.

Type Material.—The female holotype, male allotype, and 14 paratypes were collected at the type locality on July 9, 1953; two other paratypes were taken seven miles northeast of Tapanatepec, Oaxaca, Mexico, on the same day. The holotype, allotype, and some paratypes are in the Snow Entomological Collections; other paratypes are in the Canadian National Collection and the collections of the U.S. National Museum.

***Cryptocleptes yuccae*, new species**

This species is very closely allied to *minulus*, but lacks the median impression on the frons; it also differs by having the striae reduced in size and the elytral vestiture hairlike.

Female.—Length 1.06 mm., 2.7 times as long as wide; body colour almost black, pronotum usually a little lighter.

Frons convex, with a small feeble median impression; surface coarsely reticulate, sparsely clothed with minute hair. Eye short, oval; finely granulate. Antennal scape, funicle, and club subequal in length.

Pronotum short, 0.9 times as long as wide; sides feebly arcuate, weakly constricted anterior to middle; rather broadly rounded in front; summit just anterior to middle, rather high; posterior half finely reticulate, with a few minute punctures; vestiture sparse, consisting of flattened bristles on asperate area, and short fine hair in posterior area.

Elytra 1.8 times as long as wide, 2.1 times as long as pronotum; sides straight and subparallel on basal two-thirds; rather narrowly rounded behind; striae and strial punctures minute, shallow, obscure; interstriae smooth and shining, the punctures minute and obscure. Declivity steep, convex; interstrial punctures finely granulate. Vestiture consisting of minute strial hair, and longer interstrial hair.

Male.—Similar to female except: body slightly shorter and stouter; anterior margin of pronotum with four small teeth; interstriae each with a row of granules; declivity not as steep; and interstrial bristles flat but not scalelike on declivity.

Type Locality.—Tecamachalco, Puebla, Mexico.

Host.—*Yucca* sp.

Type Material.—The female holotype, male allotype, and three paratypes were collected at the type locality on July 2, 1953, from the leaves of a Joshua tree. The holotype and allotype are in the Snow Entomological Collections; the paratypes are in the Canadian National Collection.

***Stenoclyptus ruficollis*, new species**

This species is without doubt congeneric with *rhois* Blackman, but is not closely allied. The short subtriangular antennal scape of the female necessitates modification of the generic description to include this species. The essential generic characters for separating *Stenoclyptus* from *Thysanoes* and *Pseudothysanoes* appear to be the slender antennal club with the sides constricted at the

rather weakly arcuate sutures; and the subvertical, bisculate elytral declivity. In addition to characters of the frons and antennal scape, this species is distinguished from *rhois*, *ceanothi* Blackman, and *sulcatus* (Bruck) by the smaller size, the rufescent pronotum, the finer sculpture of the pronotum and elytra, and the scalelike pubescence on the declivity.

Female.—Length 1.3 mm. (paratypes 1.2-1.4 mm.), 2.8 times as long as wide; mature colour of pronotum reddish-brown, elytra black.

Frons rather broadly concave from epistomal margin to upper level of eyes; surface evidently rather coarsely reticulate, largely obscured by the numerous short erect, coarse setae covering concave area. Eyes oval, short; finely granulate. Antennal scape short, subtriangular, ornamented by a tuft of very long yellow hair; club similar to *rhois*, the sutures less strongly arcuate.

Pronotum subcircular in outline; asperities rather small; posterior half coarsely reticulate with a few fine inconspicuous punctures; vestiture consisting of short coarse hairs, some of them almost scalelike.

Elytra 1.7 times as long as wide; sides straight and subparallel on basal two-thirds, subtruncate behind; surface (usually) obscured by an incrustation; striae not impressed, the punctures fine, shallow, not close; interstriae wider than striae, flat, minutely rugulose, the punctures obscure, minute, and evidently very sparse. Declivity very steep, vertical on more than lower half; suture elevated similar to, but more shallowly sulcate and with convexities lower, than in *rhois*. Vestiture sparse, irregular; consisting of erect spatulate interstrial bristles, somewhat longer on declivity.

Male.—Similar to female except: frons concave on a very small area, the pubescence reduced or absent on the median area; antennal scape short, only slightly flattened, the pubescence short, scanty; and anterior margin of pronotum armed by two teeth.

Type Locality.—Twelve mile southeast of Matamoros, Puebla, Mexico.

Host.—Unknown.

Type Material.—The female holotype, male allotype, and 82 paratypes were collected at the type locality on July 3, 1953, from the bark of twigs of a large nut-bearing tree having pinnately compound leaves. Two females were associated with each male. The galleries were transverse, very similar to those of *Pseudothysanoes rigidus* (Leconte). The holotype, allotype, and paratypes are in the Snow Entomological Collections; other paratypes are in the Canadian National Collection and the Collections of the U.S. National Museum.

Stenoclyptus sulcatus (Bruck)

Two paratypes of *Pseudothysanoes sulcatus* Bruck, from the same series as the type specimen, were examined. These specimens belong to the genus *Stenoclyptus* Blackman, consequently, Bruck's name must be transferred to that genus.

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